THE FISHES
OF THE
INDO-AUSTRALIAN ARCHIPELAGO

VI

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WEBER, W.M.C. & L.F. de Beaufort
THE FISHES OF
THE INDO-
AUSTRALIAN
ARCHIPELAGO

1931

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INDO-AUSTRALIAN ARCHIPELAGO

VI

PERCIFORMES (CONTINUED)

Families: SERRANIDAE, THERAPONIDAE,
SILLAGINIDAE, EMMELICHTHYIDAE,
BATHYCLUPEIDAE, CORYPHAENIDAE,
CARANGIDAE, RACHYCENTRIDAE,
POMATOMIDAE, LACTARIIDAE, MENIDAE,
LEIOGNATHIDAE, MULLIDAE

with 81 illustrations

BY

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INTRODUCTION.

This volume contains the continuation of the Division Perciformes of the Suborder Percoidea, belonging to the order Percomorphi as defined in the Addenda on page 409 of the present volume.

It comprises the families: *Serranidae*, *Theraponidae*, *Sillaginidae*, *Emmelichthyidae*, *Bathyclupeidae*, *Coryphaenidae*, *Carangidae*, *Rachycentridae*, *Pomatomidae*, *Lactariidae*, *Maenidae*, *Leiognathidae*, *Mullidae*.

A part of this well founded families are rather small units, some of them represented by a single or a few genera and species only. Other families are less distinctively separated and show a more or less close relationship. This is the case with the *Carangidae* and the kindred: *Chorineminae*, *Trachinotinae* and *Seriolinae*. We have united them as subfamilies with the *Carangidae* to lay stress on their probable genetic connexion and to reduce the number of the numerous families of the Perciformes and to facilitate their taxonomic review.

About the material at our disposal we refer to the repeated statements made in the Introductions to the former volumes.

In preparing this volume we have again to thank Prof. E. D. VAN OORT, the Director, and Dr. F. P. KOUMANS of the Leiden Museum, for giving us every facility to study the fishes of that Museum. It is a pleasing duty of thanking for similar help Mr. C. TATE REGAN, Director of the British Museum (Natural History) and especially Mr. J. R. NORMAN, the Curator of Fishes of that Museum.

It will be of service to those who use the present volume, to remember, that in the Introduction to the second volume we have defined the character and geographical limits of the area from which the fishes are described.

For their benefit we repeat also the technical informations, given in the Introduction to the former volumes of this series.

„In describing the fishes we understand by *Length*, in the discussion of the proportions, the distance between the snout and the base of the caudal fin; in giving the largest size known for a species, we include the caudal fin.

The *Head* is measured from the tip of the snout to the end of the opercle, its proportion to the length is indicated e.g. as follows: head $4—4^1/_2$ means, that the length of the head is contained 4 to $4^1/_2$ times in the length.

Height is the maximum height; in special cases it is indicated how it is measured; the figures placed behind „height" indicate how many times it is contained in the length.

The size of the *Eye*, the lengt of the *Snout*, of the *Jaws* etc. are compared with the length of the head; thus „eye 4" means, that its diameter is $^1/_4$ of the length of the head.

In counting the *Scales*, under „*L. l.*" is given the number of scales, with or without sensory organs, between the head and the caudal fin or, in most cases, between that fin and the upper corner of the opercle.

L. tr. $\frac{3\frac{1}{2}}{6\ (7)}$ signifies, that there are $3^1/_2$ rows of scales between the dorsal fin and the lateral line and 6 to 7 below it, the lateral line itself is in this case not counted. In other cases the lateral line itself is also counted f.i. *L.tr.* $\begin{array}{c}4\frac{1}{2}\\ \hline 1\\ \hline 1\end{array}$ (between D. and V.), which signifies, that there are $4^1/_2$ rows of scales between the dorsal fin and the lateral line, one in the lateral line itself and one between it and the ventral fin.

In the *Fin formulae* the spines and the simple, non-branched rays are generally indicated by a figure, separated by a point from that of the number of the branched rays.

The last soft ray of the dorsal and anal, in case it is cleft to the base and therefore counted as two by some authors (Bleeker e.g.), is reckoned as one, being supported by a single pterygophore.

The *Gillmembranes* may be totally free from each other and from the isthmus; they may be united, but still remain free from the isthmus; or they may be connected with the isthmus and with each other; when in the last case the posterior border of the united gillmembranes is not quite adnate to the isthmus, there remains a free posterior margin, running as a fold over the isthmus from one gillopening to the other.

We follow the law of priority and use the oldest name which can with certainty be made out by the description, belonging to a certain species. Its author is quoted as the author of the species and his paper is quoted in the first place, when there is no stringent reason to do otherwise.

Mention is further made of all synonyms; besides, we have quoted those papers, wich contain a description of the species. If it is a widely spread one, only those papers are quoted, which contain a description of or give some informations — others than those regarding locality only — about Indo-Australian specimens of that species.

According to the international rules of nomenclature we have neglected the generic names, as e. g. those of SWAINSON, which are not accompanied by a description.

We have recorded under: „nomina indigena" those native names, wich seemed to us to be trustworthy. We are of opinion that no great value ought to be attached to them, as the unavoidable series of difficulties is still enlarged by the fact, that the authorities for those names have mostly been European or American ichthyologists and no linguists."

Finally there remains for us the pleasing duty of expressing our sincere thanks to Mr. J. F. OBBES to whom we are indebted for most of the figures, which illustrate this volume and to Mr. C. PELTENBURG, head of the publishing and printing firme E. J. BRILL Ltd. of Leiden, for his help and interest in publishing this volume.

Eerbeek / Amsterdam, December 1931.

MAX WEBER.
L. F. DE BEAUFORT.

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Order PERCOMORPHI (continued)[1].

I. Suborder **Percoidea** (continued)[2].

1. Division PERCIFORMES (continued)[2].

7. Family SERRANIDAE.

Body oblong, compressed, of medium or large size; covered by small or large adherent cycloid or mostly ctenoid scales, sometimes embedded in the skin. Lateral line usually complete and single, not extending on caudal; in one subfamily divided into an upper and lower portion. Mouth protractile, large or moderate, not very oblique; maxillary broadened distally, covering a posterior process or expansion of the intermaxillary, usually exposed, rarely slipping below the praeorbital. A supplemental maxillary present or absent. In the jaws villiform bands of teeth or series of conical ones, of which the inner one may be depressible; in front often mixed with canines; teeth present also on vomer and palatines. Head usually entirely scaly; scales always on cheeks and opercular apparatus. Operculum with one to three spines; praeoperculum with the hind-border serrate or with some spines, its lower border with or without antrorse spines or teeth. Five to eight, usually 6—7 branchiostegals; gillmembranes separate, free from isthmus; pseudobranchiae present; four ($3^{1}/_{2}$) gills; gillrakers short or long, usually stiff. Second orbital with a subocular shelf, supporting the eye. Two pairs of nostrils, the posterior sometimes the larger. A spinous dorsal, continuous or confluent at its base with the soft, many-rayed portion, usually well developed; anal with three spines, in some genera wanting. Caudal with 15–17 principal rays, 13 or 15 of which are branched. Vertical fins with the base of their membrane, at least in the softrayed portion, often scaled. Pectorals thoracic, rounded or cuneiform. Ventrals below them, with a spine and five branched rays, without an axillary

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1) On p. 268, Vol. V, this order was erroneously called „Perciformes".

2) See Addenda and Corrigenda at the end of this volume.

scale. Vertebrae 24 (10 + 14), their number sometimes increased.

Carnivorous, chiefly marine fishes of warm and temperate seas, some living in fresh and brackish water.

Key to the indo-australian subfamilies of Serranidae.

I. Lateral line single, continuous to caudal or nearly so.
  - A. Supplemental maxillary present; scales cycloid or ctenoid, usually small, often embedded in the skin or, in *Centrogenysinae*, rather large. Dorsal VI—XIV, 9—21.
    - 1. Praeoperculum with several strong spines. Scales cycloid, embedded in skin. Teeth in villiform bands, those on vomer in ∧ form. Ventrals before pectorals. Gillmembranes separate. Chin in indo-australian genera with a large or rudimentary dermal appendage . . . . 1. *Grammistinae* p. 3.
    - 2. Praeoperculum with a double serrated edge. Scales ctenoid, free. Teeth in villiform bands; those on vomer in two separate patches. Ventrals below pectorals. Gillmembranes united. No mental appendage. 2. *Diploprioninae* p. 7.
    - 3. Praeoperculum entire or moderately serrate, its lower limb with or without a distinct antrorse spine. Scales small or minute and ctenoid or cycloid, or rather large and strongly ciliated. Ventrals below or behind base of pectorals. Gillmembranes separate. No mental appendage.
      - *a*. Teeth pluriseriate, the inner series enlarged, depressible, hinged at base; scales minute, ctenoid or cycloid. Dorsal VI—XI (XII), 11—21; pectorals 15—20 divided rays and a scaly process above axil. Caudal with 15 branched rays . 3. *Epinephelinae* p. 10.
      - *b*. Teeth minute in villiform bands; no enlarged, depressible teeth; scales rather large, strongly serrate. Dorsal XIII—XIV, 9—11; pectorals 13—14 divided rays, without axillary process. Caudal with 12 divided rays . . . . . . 4. *Centrogenysinae* p. 86.
  - B. No supplemental maxillary. Scales large or moderate. Praeoperculum serrate (by exception entire). Teeth, with one exception in villiform bands, usually intermixed with not depressible caniniforms.

1. Maxillary naked. Lateral line complete, not close to dorsal. Dorsal X, 11—15; caudal with 15 branched rays . . . . 5. *Serraninae* p. 88.
2. Maxillary with imbricate scales. Lateral line, close to dorsal, continuous or reduced. Dorsal IX—XII, 9—20. Caudal with 13 branched rays . . . . 6. *Anthiinae* p. 94.

II. Lateral line divided in an upper and lower portion. Praeoperculum entire or with a flat superior spine only, operculum unarmed . . . . 7. *Pseudochromidinae* p. 116.

1. Subfam. GRAMMISTINAE.

Body oblong, compressed, covered with very small, cycloid scales, more or less embedded in the skin; lateral line complete, the sensory tubes straight. Head entirely covered with minute scales, or only its sides scaled. Mouth large, protractile, oblique; maxillary exposed with a supplemental bone, lower jaw prominent, the chin with or without a prominent or rudimentary fringed dermal appendage. Praeoperculum and operculum posteriorly with several strong spines. Gillmembranes separate; 7 branchiostegals; gillrakers short; pseudobranchiae present. Villiform teeth in bands on jaws, vomer and palatines; tongue smooth. Spinous and soft dorsal fins connected at base; the former with six to eight spines, the latter with a spine and 11—15 rays or the dorsal fins are separate with II— III (IV) spines and 23—26 rays. Three anal spines, if developed. Caudal rounded. Pectorals rounded with 16 or 17 rays. Ventrals close together, slightly in advance of origin of pectorals with a strong but short spine and 5 rays; without a scaly axillary process. Vertebrae 11 + 13 or 10 + 14; intermaxillaries reaching frontals, which embrace a fossa in front.

Distribution: Marine fishes of tropical Western Indopacific and tropical America.

Key to the indo-australian genera of Grammistinae.

1. Spinous dorsal with 6 or 7 spines; no separate anal spines developed; chin with a rudimentary dermal appendage; head scaled on sides only . . . . 1. *Grammistes* p. 4.
2. Spinous dorsal with 7 or 8 spines; strong anal spines separate; chin with a large dermal appendage; head entirely scaled . . . . 2. *Pogonoperca* p. 6.

1. Grammistes Bloch, Schneider.

Bloch, Schneider, Systema Ichthyologiae 1801, p. 182, emend.
Cuvier, Règne Anim. 1817, p. 281.
Grammistes Bleeker, Atl. ichthyol. VII. 1873—1876, p. 69 (p. p.).

Body oblong, compressed, covered with very small cycloid, obtusely keeled scales, embedded in the epidermis. Head scaly on the sides, otherwise naked; chin with a rudimentary dermal appendage; posterior border of praeoperculum with two to four spines, operculum with three strong spines. Spinous dorsal with six to seven rather strong spines, covered with thick skin, broadly connected with the soft dorsal with one spine and 13—15 rays. Anal short, with 10—11 rays, no distinct spines developed. Caudal rounded. Pectorals rounded; ventrals with a short spine. For other characters see those of the family.

Distribution: that of the single species known.

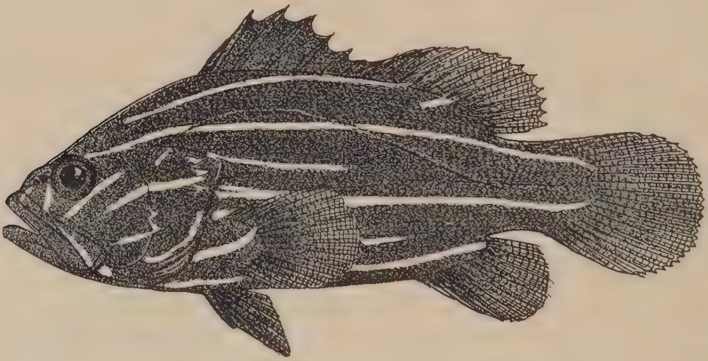

Fig. 1. *Grammistes sexlineatus* (Thunb.) half n. s.

1. Grammistes sexlineatus (Thunb.) [Fig. 1. pag. 4].

Perca sexlineata Thunberg, Vetensk. Ac. Handl. Stockholm XIII, 1792, p. 142.
Grammistes orientalis Bloch, Schneider, Syst. Ichth. 1801, p. 188.
Bodianus sexlineatus Lacépède, Hist. Nat. Poissons IV. 1802, p. 285, 302.
Sciaena vittata Lacépède, l. c. p. 310, 316.
Perca triacantha Lacépède, l. c. p. 398, 424.
Perca pentacantha Lacépède, ibidem.
Centropomus sexlineatus Lacépède, o. c. V. 1803, p. 689.
Grammistes orientalis Cuvier & Valenciennes, Hist. Nat. Poissons II. 1828, p. 203.
Grammistes orientalis Bleeker, Nat. Tijdschr. Ned. Indië IV. 1853, p. 105.
Grammistes orientalis Günther, Cat. Brit. Mus. I. 1859, p. 171.
Grammistes orientalis Klunzinger, Abhandl. zool. bot. Ges. Wien XX. 1870, p. 707.
Grammistes orientalis Günther, Fische der Südsee I. 1873—1875, p. 10.

Grammistes orientalis Bleeker, Verh. Akad. Amsterdam XIV. (1873) 1874, Révis. Epineph. p. 129 — Atl. ichth. VII. 1873—1876, p. 70.
Grammistes orientalis Day, Fishes of India 4°, 1878—1888, p. 28.
Grammistes orientalis Macleay, Descript. Cat. Austral. Fish. I. 1881, p. 26.
Grammistes sexlineatus Klunzinger, Fische des Rothen Meeres I. 1884, p. 10.
Grammistes sexlineatus Boulenger, Cat. Brit. Mus. 2nd ed. I. 1895, p. 346.
Grammistes sexlineatus Jordan & Seale, Bull. Bureau Fish. XXV. (1905) 1906, p. 260.
Grammistes sexlineatus Gilchrist & Thompson, Ann. South Afric. Museum VI. (prt. 2) 1908, p. 145.
Grammistes sexlineatus Pellegrin, Bull. Soc. Zool. France XXXIX. N⁰. 5, 1914, p. 224.
Grammistes sexlineatus Barnard, Ann. South Afric. Museum XXI. 1925—1927, p. 492.
Grammistes sexlineatus Fowler, Fish. Oceania, Mem. Bishop Mus. X, 1928, p. 187.

D. VI—VII, I. 13—15; A. 10; P. 2.15; V. I. 5; L.l. 63—72; L. tr. $\begin{array}{c} 9\text{—}11 \\ \hline 1 \\ \hline 40\text{—}43 \end{array}$.

Height 2.4—2.6, 3—3.1 in length with caudal. Head 2.4—2.9, 3.1—3.3 in length with caudal. Eye 4.2—5, equal to snout or slightly less than snout. Interorbital space somewhat convex, five seventh of eye in small specimens, almost equal to eye in larger ones. Mouth very oblique; lower jaw somewhat projecting, with a rudimentary dermal appendage on the chin. Small teeth in four to five rows in jaws, in a triangular patch on vomer and in two rows on palatines. Tongue smooth. Three or four separate spines along hindborder of praeoperculum. Operculum with three spines. Origin of dorsal slightly behind base of pectorals. Dorsal spines covered with thick skin; second and third spine somewhat longer than the others, slightly shorter than longest soft rays and about equal to one and a half diameter of eye. Origin of anal about below middle of soft portion of dorsal. Dorsal and anal rounded. Caudal rounded. Pectorals rounded, equal to or somewhat longer than postorbital part of head. Ventrals somewhat shorter, their spine thick, covered by skin and half as long as the longest soft ventral ray. Caudal peduncle about as long as broad, its least height equal to eye and snout. Colour of preserved specimens dark reddish brown with white longitudinal bands, three on very young specimens, increasing in number up to nine in old specimens and partly broken on sides of head in transverse stripes. Fins brown at base, whitish along the margin. Length 200 mm.

Habitat: Sumatra (Benkulen, Kauer, Trussan, Priaman);

Batu islands; Banka; Java (Patjitan; Karangbollong, Prigi); Celebes (Menado, Tanawanko); Sangir islands; Sulu islands!; Halmahera; Ternate; Batjan; Flores; Rotti!; Buru; Ceram; Ambon!; Goram; Aru islands; Misol; Waigeu!; Mysore; New Guinea (Doreh, Kelana Harbour, South New Guinea). — Coast of Natal, Mossambique, Bourbon, Mauritius, Madagascar, Zanzibar, Red Sea, Ceylon, Madras, Aldabra, Andamans, Philippines, Formosa, North Australia, eastwards to Marquesas and Paumotu islands. — In sea.

2. **Pogonoperca** Günther.

(Günther, Cat. Brit. Mus. i. 1859, p. 169).
Grammistes Bleeker, Atl. ichth. vii. 1873-1876, p. 69 (p. p.)

Body compressed, oblong, covered with very small cycloid scales, embedded in the skin. Head entirely covered with minute scales; chin with a conspicuous dermal lobe; posterior border of rounded praeoperculum with three to five spines, operculum with three distant spines. Spinous dorsal with seven strong spines, connected at its base with the soft dorsal with one spine and eleven to twelve branched rays. Anal with three distinct separate spines and eight rays. Caudal rounded. Pectorals rounded; ventrals with a rather long spine. For other characters see those of the family.

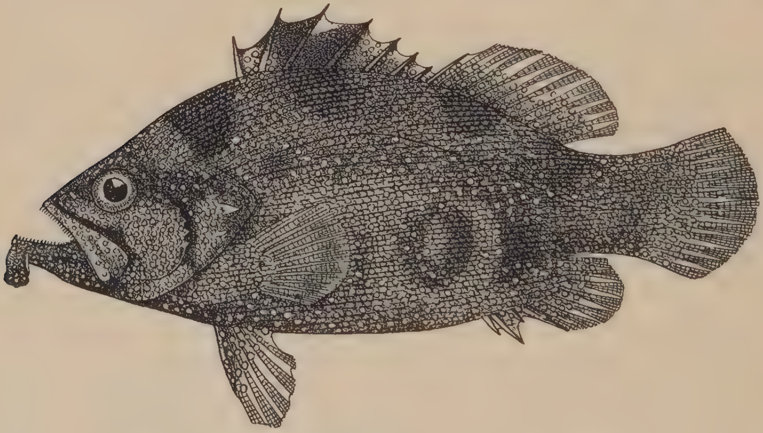

Fig. 2. *Pogonoperca punctata* (C.V.) After Bleeker.

Distribution: Marine fishes of the tropical Indic and Pacific.

1. **Pogonoperca punctata** (C. V.) [Fig. 2, pag. 6].

Grammistes punctatus Cuvier & Valenciennes, Hist. nat. Poissons VI. 1830, p. 504.
Grammistes punctatus Bleeker, Act. Soc. Sc. Indo-neerl. II. 1857, Achtste Bijdr. Vischfauna Amboina, p. 31.
Grammistes punctatus Günther, Cat. Brit. Mus. I. 1859, p. 171.
Grammistes punctatus Bleeker, Ned. Tijdschr. Dierk. IV. 1873, p. 108.
Grammistes punctatus Günther, Fische Südsee 1873—76, p. 11.
Grammistes punctatus Bleeker, Poissons de Madagascar et de Réunion, Leiden 1875, p. 24.
Grammistes punctatus Bleeker, Atl. ichth. VII. 1873—1876, p. 69.
Grammistes punctatus Day, Fishes of India 4°, Supplement 1888, p. 782.
Pogonoperca punctata Boulenger, Cat. Fishes Brit. Mus. 1895, p. 344.
Pogonoperca punctata Fowler, Fish. Oceania, Mem. Bishop Mus. X, 1928, p. 187.

D. VII. I. 11—12; A. III. 8—9; P. 1.17; V. I. 5; L.l. 60—65.

Height of body $2^1/_4$ to $2^1/_3$, head $2^4/_5$ to 3 in length. Eye $4^1/_2$ in head, equal to snout; interorbital space much less. Maxillary extending to below hindborder of eye; the width of its distal extremity equals $^2/_3$ to $^3/_4$ of diameter of eye. Lower jaw prominent with a well-developed dermal appendage at its symphysis, slightly shorter than diameter of eye. Operculum with 3 strong equidistant spines, the middle one the longest, praeoperculum rounded, in the middle of its hindborder with 3-5 spinelike teeth. Origin of dorsal opposite to base of pectorals; its soft-rayed portion obtusely rounded, somewhat higher than longest ray of the spinous portion. Caudal rounded. Pectorals rounded, about equal to postorbital part of head and to ventrals. Brown, irregularly covered with bluish white dots; five darker blotches, the first between eyes, the second on nape and opercle, the fourth and fifth triangular below spinous and soft-rayed portion of dorsal, the fifth just behind it. The bluish white dots also on base of the fins, least or even wanting on spinous dorsal. Length 230 mm [not seen by us].

Habitat: Ambon; Ternate; Misol. — Coasts of India, Mauritius, Bourbon, Madagascar, Society, Caroline Islands.

2. Subfam. DIPLOPRIONINAE.

Body oblong-oval, anteriorly elevated, much compressed, with very small, ctenoid adherent scales, which cover also the cheeks, praeoperculum and part of operculum, the head otherwise naked but rugose. Lateral line strongly arched, the top situated below middle of spinous dorsal, descending opposite to about end of soft dorsal; sensory scales with simple tubes. Head large, mouth large, protractile, strongly oblique; lower jaw slightly prominent, maxillary with a supplemental bone on top of posterior corner. Nostrils approximate, the posterior enlarged. Praeorbital rugose, its border crenulated. Praeoperculum with the inner ridge finely serrated, its outer edge is in old specimens entire above, its angle and lower limb more or less strongly denticulate. This is also the case with the sub- and interoperculum, more so in young. Operculum only above and anteriorly scaly, with 3 spines, the middle one the strongest. Coracoid and supra-scapulare scarcely serrate. Seven branchiostegals; gillmembranes united, free from isthmus; gillrakers moderate, with knob-like tips; pseudobranchiae large. Teeth on jaws, vomer and palatines in villiform bands, without canines, none on tongue, those on the elongate vomer in two separate patches. Two dorsals, connected at the base: the strongly convex spinous dorsal with VIII strong spines, the second, third and fourth the longest; soft dorsal rounded, with 14-15 rays. Anal with II spines and 12 to 13 rays. Caudal rounded with 12-15 divided rays. Fins without a basal scaly sheath. Pectorals rounded; ventrals close together, below base of pecto-

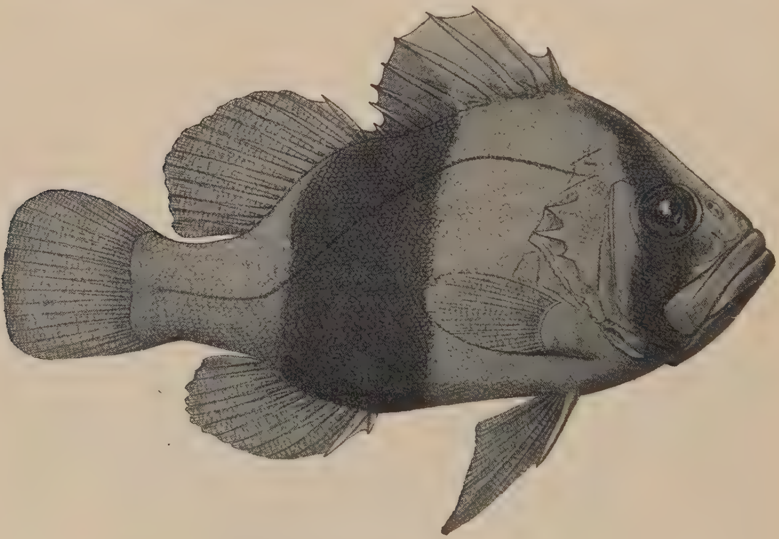

Fig. 3. *Diploprion bifasciatum* C.V. × $^2/_3$ nat. size.

rals, with a short strong spine. Axillary scale-like process wanting.
Distribution: that of the single genus known.

1. **Diploprion** (Kuhl & v. Hasselt) Cuvier & Valenciennes.

(Cuvier & Valenciennes, Hist. nat. Poissons II. 1828, p. 137).

For the characters of the genus see those of the family.
Distribution: that of the single species known.

1. **Diploprion bifasciatum** (K. v. H.) C. V. [Fig. 3, p. 8].

Diploprion bifasciatum (Kuhl & v. Hasselt) Cuvier & Valenciennes, Hist. nat. Poiss. II. 1828, p. 137.
Diploprion bifasciatum Schlegel in Temminck & Schlegel, Fauna Japon. Pisces, 1842, p. 137.
Diploprion bifasciatum Richardson, Rep. Ichth. China 1846, in Rep. Brit. Assoc. 1845, p. 221.
Diploprion bifasciatum Bleeker, Ichth. Japan, p. 59. Verh. Batav. Gen. XXVI, 1854—1857.
Diploprion bifasciatum Günther, Cat. Brit. Mus. I. 1859, p. 174.
Diploprion bifasciatum Kner, Novara-Reise, Fische 1865—67, p. 29.
Diploprion bifasciatum Bleeker, Révis. Epinephelini, p. 124, Verh. Akad. Amsterdam XIV. 1874. — Atl. ichth. VII. 1873—1876, p. 71.
Diploprion bifasciatum Macleay, Descr. Cat. Austral. Fish. I. 1881, p. 26.
Diploprion bifasciatus Jordan & Seale, Proc. Davenport Acad. Sci. X. (1905) 1907, p. 9.
Diploprion bifasciatus Jordan & Richardson, Proc. U. S. Nat. Mus. XXXVII. 1910, p. 427.
Diploprion bifasciatus Jordan & Starks, Ann. Carnegie Mus. XI. 1917, p. 448.
Diploprion bifasciatus Marshall, Mem. Queensl. Mus. IX. 1927, p. 108.

D. VIII. 12—15; A. II. 12—13; P. 15—16; V. I. 5; L.l. 110—115.

Height 2—2.5 in length; head about thrice, its rostro-dorsal profile nearly straight with a feeble concavity before eyes, with a rugose occiput; back elevated. Eyes more or less than 4 in head; their diameter equal to arched interorbital space. Upper jaw reaching about to vertical through middle of eye, nearly twice in length of head. Spinous dorsal strongly arched, with slender spines, the second, third and fourth the longest, more than twice in height; only slightly connected at its base with the soft dorsal, which is rounded, its longest ray somewhat shorter than longest spine. Anal with two weak spines, the second longer than the first. Caudal rounded, its length equal to that of the broadly rounded pectorals, which are somewhat shorter than head without snout. Ventrals with a strong spine, their outer rays prolonged, reaching past anus or on anal and longer than head. For other characters see those of the family. Colour yellowish with two broad brownish or blackish cross-bands; the narrower anterior as broad as eye, passes through it from end of upper jaw, to origin of spinous dorsal; the posterior originates about between fifth dorsal spine and anterior part of soft dorsal and descends obliquely to anterior part of anal; spinous dorsal blackish, anteriorly yellowish as the other fins, with exception of ventrals, which are dusky toward tip. Length about 240 mm.

Nom. indig.: Ongu bagus (Ambon).

Habitat: Singapore; Batu; Bintang (Riouw Archipelago); Java (Batavia); Postillon Islands!; Celebes (Macassar!); Buru; Timor; Ambon; Ternate — British India (very rare), Ceylon.

3. Subfam. EPINEPHELINAE.

Body oblong or elongate, more or less compressed, often rather stout; covered with small or very small, cycloid or ctenoid scales, adherent, often embedded in the skin. Lateral line complete, usually running low, with the scales triangular, cycloid or ciliated, normal or with radiating ridges, the sensory tubes with ascending tubule, rarely branching; in a few genera reduced. Head entirely or partly scaled; snout naked. Nostrils subequal or the posterior much the larger, slit-like. Praeopercle entire or usually moderately serrate behind, its lower limb with or without distinct antrorse spines. Operculum with one, two or three strong spines. Mouth large, protractile, more or less oblique; jaws subequal or the lower one the longer. Maxillary large, with a well-developed supplemental bone, usually covered with small scales; exposed, not concealed by the suborbital, when the mouth is closed. Teeth in jaws pluriseriate, in the inner series enlarged, depressible, hinged at their base; usually a few large canines in front; acute teeth on vomer and palatines, none on tongue. A single dorsal fin with VI to XI (XII) spines and 11—21 rays, usually all branched; the spinous and soft-rayed portion subequal or the soft the shorter. Anal short; III, 8—12. Caudal rounded, truncate or emarginate, usually with 17 principal and 15 branched rays. Soft rayed portion of vertical fins generally more or less scaly. Pectorals rounded, more or less symmetrical, with 15—20 branched rays and with or without a more or less developed scaly process above axilla. Ventrals inserted below pectorals, close together with a feeble, flexible or usually a strong spine and five rays. Gillmembranes separate, free from isthmus; 7 branchiostegals; pseudobranchiae present; four gills, the gillrakers very short or more or less elongate. Intermaxillary with or without a process fitting into a cavity or emargination at the anterior extremity of the frontals. Supraoccipitals and parietals usually extending forwards to between postfrontal processes. Vertebrae 24 (10 + 14).

Distribution: Carnivorous fishes, often of large size, living chiefly along shores, a few genera prefering deeper water, inhabiting tropical and temperate seas.

Key to the indo-australian genera of Epinephelinae.

I. Canine teeth present.
  1. Palatines toothed.
    a. D. IX—XI, 12—21. Lower border of praeoperculum without antrorse or downward directed spines. Head entirely scaly or nearly so. Anal and ventral spines strong.
      a'. One or two curved canines on each side of the mandible besides those in front . . . 1. *Variola* p. 11.
      b'. No curved canines on the sides of the mandible 2. *Epinephelus* p. 14.
    b. D. VI—VIII, 11—12. Lower border of praeoperculum with strong antrorse spines. Head naked on front, snout and suborbital bones. Anal and ventral spines feeble and flexible. . . . . . 3. *Plectropoma* p. 76.
  2. Palatines toothless. D. XI, 14—15. Lower border of praeoperculum without antrorse spines. Head entirely scaly. Anal spines moderate . . . . . 4. *Anyperodon* p. 80.
II. No canine teeth; palatines toothed. D. X. 10. Lower border of praeoperculum without antrorse spines, its angle with enlarged serrae. Anal spines moderate . . 5. *Cromileptus* p. 84.

1. **Variola** Swainson.

(Swainson, Natural History, Fishes II. 1839, p. 202).

Body stout, moderately compressed, covered with small ctenoid scales; lateral line complete, arched. Head covered with cycloid scales. Mouth large, protractile, maxillary exposed, with supplemental bone. Lower jaw prominent. Praeoperculum finely serrated in young, smooth in old specimens, its lower border without conspicuous antrorse spines; operculum with three spines. Gillmembranes separate; seven branchiostegals; pseudobranchiae present. Gillrakers short and few. Teeth in jaws pluriseriate, the inner series enlarged, depressible, hinged at the base. Two curved canines anteriorly in both jaws and one or two canines on each side of the mandible. Teeth on vomer and palatines, tongue smooth. A single dorsal fin, the spinous portion with nine spines, the soft portion with 13—14 rays. Anal with three spines and 8 soft rays. Caudal crescentically notched, the outer rays produced. Vertical fins more or less covered by scales. Pectorals rounded, with 18 rays and a scale-like process above axilla. Ventrals below pectorals, close together, with a strong spine and the second ray produced.

Distribution: that of the single species known.

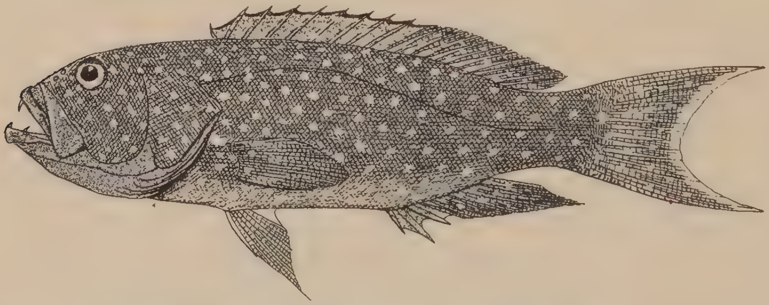

Fig. 4. *Variola louti* (Forsk.). × $^5/_9$ nat. size.

1. **Variola louti** (Forsk.) [Fig. 4, p. 12].

Perca louti Forskål, Descript. Animalium 1775, p. 40.
Bodianus louti Bloch, Schneider, Syst. Ichth. 1801, p. 332.
Labrus punctulatus Lacépède, Hist. Nat. Poissons III. 1802, p. 431, 477.
Bodianus louti Lacépède, l.c. IV. 1802, p. 286.
Serranus luti Cuvier & Valenciennes, Hist. Nat. Poissons II. 1828, p. 363.
Serranus punctulatus Cuvier & Valenciennes, l. c. p. 367. — IX. 1833, p. 435.
Serranus louti Rüppell, Atlas Fische Rothen Meeres 1828, p. 106.
Serranus flavimarginatus Rüppell, l. c. p. 109.
Serranus punctulatus Quoy & Gaimard, Voyage Astrolabe, Poissons, 1833, p. 654.
Serranus phaenistomus Swainson, Nat. Hist. Fish. II. 1839, p. 201.
Variola longipinna Swainson l. c. p. 202.
Serranus melanotaenia Bleeker, Acta Soc. Scient. Indo Neerl. II. 1857, Vischfauna Ambon, p. 33.
Serranus louti Günther, Cat. Brit. Mus. I. 1859, p. 101.
Serranus flavimarginatus Günthér, l. c. p. 103.

Pseudoserranus louti Klunzinger, Abh. zool. bot. Gesellsch. Wien XX. 1870, p. 687. — Fische Rothen Meeres, 1884, p. 7.
Serranus louti Günther, Fische d. Südsee, 1873—75, p. 2.
Variola flavimarginata Bleeker, Atl. ichth. VII. 1873—76, p. 23.
Variola louti Bleeker, l. c. p. 24.
Variola louti Day, Fishes of India 4^0, 1878—88, p. 26.
Epinephelus louti Boulenger, Cat. Brit. Mus. 2nd. ed. I. 1895, p. 173.
Variola louti Jordan & Seale, Bull. Bur. Fish. XXV. (1905) 1906, p. 257.
Variola flavimarginata Jordan & Seale, ibid.
Variola louti M. Weber, Siboga-Exp. Fische 1913, p. 198.
Variola louti var. *flavimarginata* M. Weber, ibid.
Variola louti Fowler, Fish. of Oceania, Mem. Bern. P. Bish. Mus. X. 1928, p. 173.

D. IX. 13—14; A. III. 8; P. 1.17; L.l. 115—120; L. tr. $\begin{array}{c}10\text{—}13\\ \hline 1\\ \hline 56\text{—}60\end{array}$.

Height 2.8—2.9, 3.8—4 in length with caudal. Head 2.5—2.6, 3.3—3.6 in length with caudal. Eye 5.1—6.4, equal to or somewhat more than interorbital space and less than snout. Mouth oblique, maxillary reaching to below hindborder of eye, the width of its distal extremity 1.2—1.5 in eye. Lower jaw projecting. Praeoperculum rounded, its hindborder very finely serrated, the serrae disappearing in old age. Opercular flap obtusely pointed. Middle opercular spine nearer to lower than to upper, lower further back than upper. About 8 gillrakers and some rudiments on lower branch of anterior arch, shorter than gillfringes. Dorsal originating above pectorals, spines increasing in length to the third, which goes 3.3—3.7 in head. Following spines subequal, soft dorsal and soft anal pointed, the longest rays more or less produced in the adult. Third anal spine slightly longer than second, equal to or a little less than second dorsal spine. Pectorals equal to postorbital part of head, ventrals longer, the second soft ray more or less produced in the adult. Caudal crescentically notched, the outer rays more or less produced. Colour of alcohol specimens brownish or reddish, head, body and fins covered with light spots, which are not always very distinct. Middle parts of caudal often more or less blackish distally and with a white hindborder. In some specimens, probably only in young ones, a broad dark brown band from eye to basal part of caudal (var. *flavimarginata*). Length over 400 mm.

Habitat: Sumatra (Padang, Siboga); Java; Celebes (Menado, Kema); Sulu islands!; Talaut islands!; Ternate; Batjan; Ambon; Banda!; Timor; Damar!; Waigeu; New Guinea (Doreh);

Mysore. — From Madagascar, Zanzibar, Red Sea, Seychelles, coast of India to Okinawa, Philippines and eastwards to Paumotu Islands.

2. **Epinephelus** Bloch.

(Bloch, Ausl. Fische IV, 1790, p. 33).

Body stout, more or less compressed, covered with small ctenoid scales, often embedded in the skin and often surrounded by still smaller scales; lateral line complete, not very conspicuous, running parallel to curve of back, its scales triangular with a short ascending, rearely branching sensory tube. Head entirely scaly or nearly so. Mouth large, protractile, maxillary exposed, with supplemental bone, its surface usually with small scales; lower jaw prominent, scaly. Praeoperculum usually moderately serrated, stronger when young; its lower border without conspicuous antrorse spines; operculum with one to three spines. Gillmembranes separate; seven branchiostegals; pseudobranchiae present. Gillrakers short and few, more or less elongate or even very long. Teeth in jaws pluriseriate, the inner series enlarged, depressible, hinged at the base; anteriorly usually more numerous with one or two curved canines. Teeth on vomer and palatines; tongue edentulous. A single dorsal fin, the spinous portion with eight to twelve, usually eleven, not depressible spines, as long as or longer than the soft portion which has twelve to twenty one rays. Anal short with three spines, the second usually the larger and seven to twelve rays. Caudal truncate, rounded or emarginate with fifteen branched rays. Vertical fins generally more or less covered by scales.

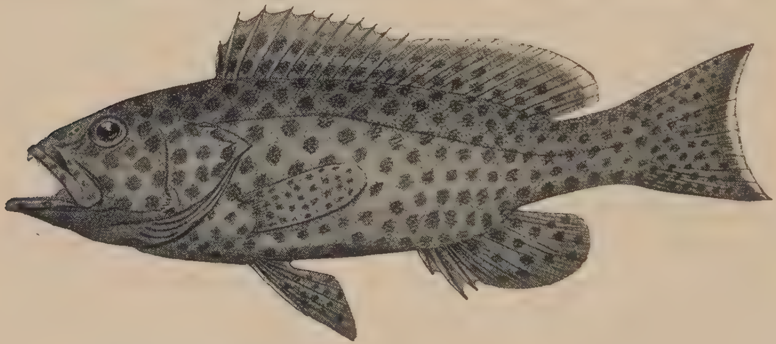

Fig. 5. *Epinephelus areolatus* (Forsk.) × $^4/_{11}$ nat. size.

Pectorals rounded, symmetrical or subsymmetrical, with 15 to 20 rays and a scale-like process above axilla. Ventrals below pectorals, close together, with a strong spine. After Boulenger the supraoccipital and parietal bones extend forwards to between postfrontal processes. Vertebrae 24 (10 + 14).

Distribution. The numerous species of these much valued food fishes are widely distributed in all tropical and subtropical seas. Most of them attain a large size and are living in costal and deep water.

Key to the indo-australian species of Epinephelus.

I. Dorsal with 9 spines.

A. Anal with 8 soft rays.

a. Second anal spine as long as or slightly shorter than soft anal rays. Head uniform or spotted . . . . 1. *E. pachycentrum* p. 19

b. Second anal spine shorter than soft anal rays.

a'. Maxillary reaching to below hindborder of eye. Head uniform or with transverse lines . . . . 2. *E. boenack* p. 20.

b'. Maxillary reaching beyond hindborder of eye. Head spotted . . . . 3. *E. cyanostigma* p. 22.

B. Anal with 9 soft rays.

1. Caudal truncate. Colour uniform dark brown or black. D. IX. 17—18 . . . . 4. *E. rogaa* p. 24.

2. Caudal rounded.

a. L.l. 100—112. L. tr. 11—15 above L.l.

a'. L. tr. 11—14 above L.l. A meshwork of darkbrown on head and anterior part of back. Caudal with a more or less distinct dark border . . . 5. *E. sonnerati* p. 25.

b'. L. tr. 15 above L.l. Head often dotted with yellowish. Pectorals and caudal edged with white . . . . 6. *E. nigripinnis* p. 26.

b. L.l. 81—105. L. tr. 8—10 above L. l.

a'. Pectorals as long as head without snout. Caudal often with two oblique white bars, converging behind . . 7. *E. urodelis* p. 27.

b'. Pectorals equal to postorbital part of head.

a^2. Second anal spine somewhat longer than third. Head, body and all fins spotted. . . . . 8. *E. argus* p. 28.

b^2. Second and third anal spines

subequal. Head and body spotted. P. unspotted or with a few spots only . . . . 9. *E. miniatus* p. 30.

c^2. Second anal spine slightly longer than third. If spotted, only on head and anterior part of body. 10. *E. aurantius* p. 32.

c'. L.l. 72—87. L. tr. 6—7 above L. l. Caudal with two black converging bands, which may be united into a crescentic one . . . . 11. *E. leopardus* p. 33.

II. Dorsal with 11 spines.

A. Caudal subtruncate, truncate or emarginate.

1. Height 2.4—2.7. Head and body dark violet. Caudal peduncle, fins and lips yellowish . . . . 12. *E. flavocaeruleus* p. 35.

2. Height 2.8—3.

a. 18—19 soft dorsal rays. Head with spots, confluent into wavy lines on body. 13. *E. undulosus* p. 36.

b. 15—17 soft dorsal rays.

a'. Opercular spines nearly equidistant

a^2. L. tr. 12—15 above L. l. Large spots, vertical fins with a dark band, bordered by light . . . 14. *E. areolatus* p. 37.

b^2. L. tr. 16 above L. l. Brown with a meshwork of lighter . . . . 15. *E. chlorostigma* p. 39.

c^2. L. tr. 15—16 above L.l. Lower half of caudal dark brown, contrasting with lighter upper half 16. *E. bleekeri* p. 40.

b'. Middle opercular spine nearer to lower than to upper. More or less distinct vertical bars on body and tail 17. *E. diacanthus* p. 41.

c. 14—15 soft dorsal rays. Body with bands, running obliquely backwards to dorsal. 18. *E. morrhua* p. 42.

B. Caudal rounded.

1. Interorbital width nearly equal to eye. D. XI. 14. L. tr. 15—17 above L.l. A black spot on dorsal side of caudal peduncle . 19. *E. dämelii* p. 44.

2. Interorbital width less than eye.

a. Pectorals longer than head without snout. Large dark spots of unequal size, the interspaces forming a broad network. D. XI. 16—18 . . . . 20. *E. megachir* p. 45.

b. Pectorals shorter.

a'. Last dorsal spine considerably shorter than third spine.

a^2. L. tr. 8—9 above L. l. D. XI. 14—15. Upper opercular spine indistinct. Dark cross bands . . 21. *E. sexfasciatus* p. 46.

b^2. L. tr. 11—12. D. XI. 15—17.

a^3. Middle opercular spine nearer lower than upper. Black spots, white patches in young specimens . . . . 22. *E. maculatus* p. 47.

b^3. Opercular spines equidistant or nearly so.

a^4. Each scale with a white spot. L.l. 88. . . . . 23. *E. rhyncholepis* p. 49.

b^4. Dark spots on fins. Body with a greyish network. L.l. 109 . . . . 24. *E. dictiophorus* p. 50.

c^4. Head, body and fins with dark spots. L.l. 91 . . 25. *E. bontoides* p. 51.

d^4. Dark crossbars and scattered spots on body. L.l. 106. . . 26. *E. awoara* p. 51.

c^2. L. tr. 14 above L.l. D. XI. 15–16 (17). Dark spots. Dark blotches along base of dorsal and on caudal peduncle. L.l. 80—110 . . . . 27. *E. corallicola* p. 52.

d^2. L. tr. 12–14 above L.l. D. XI. 14—15. Upper border of opercular flap very convex. White spots. Maxillary groove edged with black . . . . 28. *E. summana* p. 54.

e^2. L. tr. 16 above L.l. D. XI. 17. Dark cross bands, edged by a series of black spots. L.l. 105 29. *E. amblycephalus* p. 56.

b'. Last dorsal spine not or slightly shorter than third spine.

a^2. Opercular spines equidistant or nearly so.

a^3. Light brown, marbled with darker. L.l. 93—105. L. tr. 13—14 above L.l. Maxillary reaching below hinderhalf of eye . . . 30. *E. nebulosus* p. 57

b^3. Uniform, yellowish or pink, with or without crossbands; upper part of spinous dorsal and ring round eye dark. L. tr. 10—12 above L.l. Maxillary reaching below posterior border of eye or not so far. . . . . 31. *E. fasciatus* p. 58.

c^3. Uniform brown, or with indications of dark crossbars or blotches. L. tr. 12–13 above L.l. Maxillary reaching beyond posterior border of eye . . 32. *E. tauvina* p. 60.

b^2. Middle opercular spine nearer to lower than to upper.

a^3. D. XI. 15—17. L. tr. 10—12 above L.l. Body with large dark spots, separated by a honeycombed network, or dark with white spots. A black blotch on caudal peduncle may be present . . . . . 33. *E. merra* p. 64.

b^3. D. XI. 14–16. L. tr. 11–15 above L.l.

a^4. Maxillary reaching below posterior border of eye. Upper border of opercular flap rounded. Dark with white spots. Scales of body ctenoid 34. *E. caeruleopunctatus* p. 66.

b^4. Maxillary reaching beyond posterior border of eye. Scales of body mostly or partly cycloid.

a^5. L.l. 110—114. L. tr. 15 above L.l. A black blotch on base of caudal peduncle. Small spots on body and fins . . . 35. *E. fuscoguttatus* p. 68.

b^5. L.l. 95—96. L. tr. 11—15 above L.l. A black blotch on base of caudal peduncle. Dotted with dark on body and fins. . . . 36. *E. polyphekadion* p. 70.

c^5. L.l. 95. L. tr. 14 above L.l. Fins with black bars, more or less broken up into spots. 37. *E. lanceolatus* p. 70.

d^5. L.l. 88. L. tr. 14 above L.l. Upper border of opercular flap convex. Brown, soft dorsal and caudal with white spots. Pectorals with dark spots . . . . 38. *E. rahanus* p. 72.

Doubtful species.

39. *E. goldiei* p. 73.
40. *E. magnificus* p. 74.

Doubtful as to locality *E. chlorocephalus* p. 75.

1. **Epinephelus pachycentrum** (C. V.).

Serranus pachycentron Cuvier & Valenciennes, Hist. Nat. Poissons II. 1828, p. 205.
Serranus guttatus Cuvier & Valenciennes, t. c. p. 359.
Serranus zananella Bleeker, Verh. Bat. Gen. XXII. 1849, Perc. p. 32 (nec C.V.).
Serranus microprion Bleeker, Nat. Tijdschr. Ned. Indië III. 1852, p. 552.
Serranus microprion Günther, Cat. Brit. Mus. I. 1859, p. 116 (part.).
Epinephelus microprion Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 155. — Atl. ichth. VII. 1873—1876, p. 39.
Epinephelus boelang Bleeker, Verh. Akad. Amsterdam XIV. 1874, N⁰. 2, p. 49. — Atl. ichth. VII. 1873—1876, p. 40.
Serranus pachycentrum Macleay, Proc. Linn. Soc. N. S. Wales V. 1880, p. 314.
Epinephelus pachycentrum Boulenger, Cat. Brit. Mus. 2nd ed. I. 1895, p. 178.
Petrometopon pachycentron Fowler, Journ. Acad. Nat. Sci. Philad. (2) XII. Prt. 4, 1904, p. 521.
Cephalopholis pachycentron Evermann & Seale, Bull. Bur. Fish. XXVI. 1906, p. 76.
Petrometopon pachycentron Fowler, Fishes Oceania, Mem. Bishop. Mus. X. 1928, p. 173.

D. IX. 15—17; A. III. 8; P. 1. 15; V. I. 5; L.l. 72—97; L. tr. $\begin{array}{c} 8\text{—}10 \\ \hline 1 \\ \hline 30\text{—}32 \end{array}$.

Height 2.4—2.9, 3.1—3.5 in length with caudal. Head 2.5—2.6, 3—3.1 in length with caudal. Eye 4.5—5.6, 1.5 or less in snout. Interorbital space somewhat less than eye. Lower jaw projecting. Mouth somewhat oblique, maxillary reaching beyond vertical through hindborder of eye; the width of its distal extremity equal to or somewhat less than diameter of eye. Teeth in the jaws forming rather narrow bands, the inner row of depressible teeth in the mandibles and those near symphysis of praemaxillaries very long and slender. An outer row of fixed teeth in the upper jaw, ending near symphysis, at each side with a canine, a similar pair of canines in the lower jaw. Praeoperculum finely serrated, its angle rounded.

Middle opercular spine nearer to lower than to upper. Opercular flap obtusely pointed, upper border convex. Head covered with cycloid scales, snout and maxillary often naked. Gillrakers 9—10 and 6—7 rudiments on lower part of anterior arch, the longest at least as long as gill-fringes. Dorsal originating above or slightly in front of base of pectorals. Spines increasing in length to the third or fourth, which go about 2.5 in head. Posterior soft rays considerably longer. Second anal spine stronger and generally considerably longer than third spine, as long as or slightly shorter than longest soft anal rays. Pectorals as long as head without snout and without opercular flap. Ventrals equal to postorbital part of head. Caudal rounded. Scales of body and tail strongly ciliated. Dark brown, with or without darker vertical bars. Head uniform or with numerous dark (bluish) dots, which may also extend on the anterior part of the body. The incised membrane of the spinous part of the dorsal black at tip. Caudal and soft dorsal and anal with a light margin, sometimes bordered at the proximal side with a black band. Length 215 mm. [Specimens of *E. microprion* and *boelang* of BLEEKER's collection in the Museum of Amsterdam seen by us].

Nom. indig.: Kerapo (Malay. Batavia); Bandih (Simalur, Tapah).

Habitat: Simalur!; Batu islands; Nias!; Singapore; Sumatra (Telokbetong, Trussan, Priaman, Padang, Siboga); Bintang; Banka; Biliton; Sunda straits; Java (Batavia, Samarang, Patjitan, Karangbollong, Tjilatjap); Bawean; Java-sea!; Celebes (Makassar!, Kwandang bay!, Bulucomba, Tanawanko, Kema, Menado); Saleyer!; Buru; Ceram; Ambon!; Timor; Halmahera; Ternate; Batjan; Waigeu!; New Guinea (Doreh). — From East coast of Africa, Ceylon, Madras, China, Philippines, North Australia, Solomon islands, Louisiade Archipelago. In sea.

Note. This species is hardly different from *E. boenack*.

2. **Epinephelus boenack** (Bl.) [Fig. 6, p. 21].

Bodianus boenack Bloch, Ausländ. Fische IV. 1790, p. 43.
Perca fusca Thunberg, Vet. Akad. Handl. XIV. 1793, p. 297.
Sciaena formosa Shaw, Nat. Misc. XXIII. 1799, pl. CVII.
Serranus boelang Cuvier & Valenciennes, Hist. Nat. Poissons II. 1828, p. 308 & VI. 1830, p. 514.
Serranus formosus Cuvier & Valenciennes, l. c. II. 1828, p. 311.

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Serranus spiloparaeus Cuvier & Valenciennes, l. c. p. 338.
Serranus boenack Cuvier & Valenciennes, l.c. p. 362.
Serranus boelang Quoy & Gaimard, Voyage Astrolabe, Poissons, 1833, p. 657.
Serranus stigmapomus Richardson, Rep. Ichth. China & Japan, Rep. Brit. Assoc. 15. Meet. 1845 (1846), p. 233.
Serranus formosus Richardson, ibid.
Serranus formosus Bleeker, Verh. Bat. Gen. XXII. 1849, Percoid. p. 31.
Serranus stigmapomus Günther, Cat. Brit. Mus. I. 1859, p. 111.
Serranus boenack Günther, l. c. p. 112 (part.).
Serranus microprion Günther, l. c. p. 116.
Serranus boenack Kner, Novara-Exp. Fische 1865—67, p. 21.
Serranus formosus Kner, l. c. p. 26.
Serranus boenack Peters, Monatsber. Akad. Berlin 1865, p. 105.
Serranus boelang Playfair & Günther, Fishes of Zanzibar 1866, p. 2.
Epinephelus boenack Bleeker, Versl. Akad. Amsterdam (2) II. 1868, p. 338.

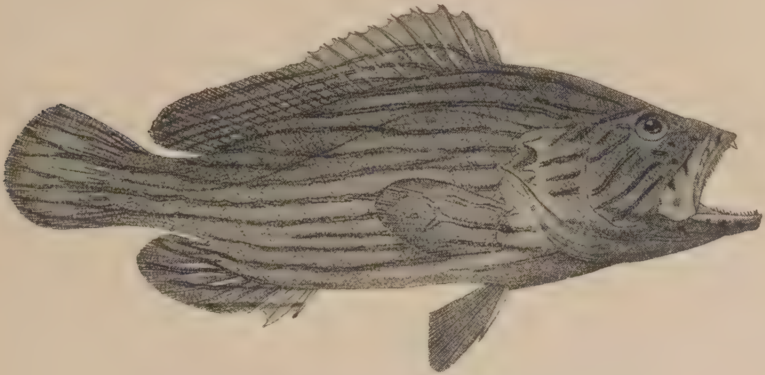

Fig. 6. *Epinephelus boenack* (Bloch). $^2/_5$ nat. size.

Epinephelus formosus Bleeker, Verh. Akad. Amsterdam XIV. 1874, Révis. Epinephelini, p. 59. — Atl. ichth. VII. 1873—76, p. 44.
Serranus boelang Day, Fishes of India 4^0, 1878—1888, p. 26.
Serranus stigmopomus Macleay, Descript. Catal. Australian Fishes I. 1881, p. 14.
Epinephelus boenack Boulenger, Cat. Brit. Mus. 2nd. ed. 1895, p. 180.
? *Cephalopholis stigmatopomus* Jordan & Seale, Bull. Bureau Fish. XXVI. 1906, p. 19.
Cephalopholis boenack Evermann & Seale, l. c. p. 77.
Petrometopon boenack Jordan, Tanaka & Snyder, Journ. Coll. Sci. Univ. Tokyo XXXIII. art. 1, 1913, p. 152.
Cephalopholis boenack Fowler, Fish. Oceania, Mem. Bishop Mus. X. 1928, p. 173.

D. IX. 15—17; A. III. 8; P. 1.16; V. I. 5; L.l. 75—88; L. tr. $\dfrac{8\text{—}10}{\dfrac{1}{32\text{—}34}}$.

Height 2.6—2.9, 3.2—3.6 in length with caudal. Head 2.5—2.6, 3.2—3.3 in length with caudal. Eye 5.5—6, 1.5—1.6 in snout. Interorbital space about equal to eye. Lower jaw projecting. Mouth somewhat oblique, maxillary reaching to vertical through hindborder of eye or a little farther, the width of its distal extremity equal to or somewhat more than eye. Teeth in the jaws forming rather narrow bands, the inner row of depressible teeth in the mandibles and those near symphysis of praemaxillaries very long and slender. An outer row of fixed teeth in the upper jaw, ending near symphysis at each side with a canine, which may be strong or moderate. A similar pair of canines in the lower jaw. Praeoperculum very finely serrated, its angle rounded. Middle opercular spine nearer lower than upper. Opercular flap obtusely pointed, upperborder convex. Head covered with cycloid scales, maxillary often naked. Gill-rakers 9—11 and 6—7 rudiments on lower part of anterior arch, the longest at least as long as gill-fringes. Dorsal originating above base of pectorals, spines increasing in length to the third or fourth, which go about 2.5 in head; posterior soft rays considerably longer. Second anal spine stronger and somewhat longer than third one, much shorter than longest soft anal rays. Pectorals as long as head without snout and without opercular flap. Ventrals as long as postorbital part of head. Caudal rounded. Scales of body and tail strongly ciliated. Colour of alcohol specimens brown or reddish brown, body with or without dark vertical bars. Head uniform or with dark transverse undulous lines (bluish in life), which may also cover the body and extend on the vertical fins and pectorals. The incised membrane of the spinous part of the dorsal black at tip. Total length 330 mm.

Nom. indig. Kerapo (Malay. Batavia); Kerapang batu (Balikpapan, Borneo).

Habitat: Singapore; Pulu Berhala!; Sumatra (Benkulen, Padang, Tiku, Telokbetong, Priaman, Siboga); Nias; Biliton; Banka; Borneo (Balikpapan!, Kota Baru!, Sarawak); Java (Batavia!, Semarang, Japara, Prigi, Tanara, Anjer); Celebes (Makassar!, Bulucomba, Tanawanko, Kema); Buru; Ambon; New Guinea. — From east coast of Africa, Red Sea, South Arabia, coasts of British India, Ceylon, Siam, Tonkin, China to southern Japan, Formosa, Philippines, North Australia. In sea.

3. **Epinephelus cyanostigma** (C. V.).

Serranus cyanostigma Cuvier & Valenciennes, Hist. Nat. Poissons II. 1828, p. 359.
Serranus cyanostigma Bleeker, Verh. Batav. Gen. XXII. 1849, Percoiden, p. 32.

Epinephelus cyanostigma Bleeker, Atl. ichth. VII. 1873—1876, p. 42.
Epinephelus cyanostigma Boulenger, Cat. Brit. Mus. 2nd. ed. 1895, p. 181 (see syn.).
Petrometopon cyanostigma Fowler, Journ. Acad. Nat. Sci. Philad. (2) XII. Part 4, 1904, p. 521.

D. IX. 16; A. III. 8; P. 2.14; V. I. 5; L.l. 90; L. tr. $\frac{9}{\frac{1}{38}}$.

Height 2.6, 3 in length with caudal. Head 2.3, 2.7 in length with caudal. Eye 5.5—7, 1.5—2 in snout and about 1.5 in interorbital space. Lower jaw strongly projecting. Mouth a little oblique, maxillary reaching beyond vertical through hindborder of eye, the width of its distal extremity more than diameter of eye. Teeth forming rather narrow bands, the inner row of depressible teeth in the mandibles and those near symphysis of praemaxillary very long and slender. An outer row of fixed teeth in the upper jaw, ending near symphysis at each side with a canine of moderate length, a similar pair of canines in the lower jaw. Praeoperculum finely serrated, its angle rounded. Opercular flap bluntly pointed, upper border very convex. Middle opercular spine much nearer to lower than to upper one. Head including snout and maxillary covered with small cycloid scales. Gillrakers about 9 1) on lower part of anterior arch, the longest at least as long as gill-fringes. Dorsal originating above base of pectorals. Spines increasing in length to the fifth or sixth, which goes almost three times in head; the soft rays are much longer. Second anal spine as long as and not much stronger than third spine, shorter than soft rays. Pectorals as long as head without snout, excluding opercular flap. Ventrals as long as postorbital part of head. Caudal rounded. Scales strongly ciliated. Colour of alcohol specimens light reddish brown, with about six darker indistinct brown broad crossbars, consisting of a wide meshwork filled with lighter. Head, body and all fins covered with light bluish ocelli. Length over 250 mm.

Nom. indig.: Kerapo-karang (Malay. Batavia).

Habitat: Sumatra (Padang, Priaman, Siboga); Java (Batavia, Bantam); Duizend islands; Celebes (Makassar, Bulucomba); Saleyer!; Flores; Batjan; Amboina. — Not known to occur outside the indo-australian Archipelago.

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1) 17 according to Boulenger l. c.

4. **Epinephelus rogaa** (Forsk.).

Perca rogaa Forskål, Descript. animalium 1775, p. 38.
Perca lunaria Forskål, l. c. p. 39.
Bodianus rogaa Bloch, Schneider, Syst. Ichth. 1801, p. 334.
Serranus rogaa Cuvier & Valenciennes, Hist. Nat. Poissons II. 1828, p. 349.
Serranus Rogaa Rüppell, Atlas Fische Roth. Meeres 1828, p. 105.
Serranus lunaria Rüppell, Samml. d. Senckenb. Mus. 1852, p. 3 (name only).
Serranus rogaa Günther, Cat. Brit. Mus. I. 1859, p. 116.
Serranus rogaa Playfair & Günther, Fishes Zanzibar 1866, p. 2.
Serranus rogaa Klunzinger, Abhandl. zool. bot. Ges. Wien XX. 1870, p. 679 — Fische d. Roth. Meeres I. 1884, p. 3.
Epinephelus rogaa Boulenger, Cat. Brit. Mus. 2nd. ed. I. 1895, p. 185.
Epinephelus rogaa Steindachner, Denkschr. Akad. Wien LXXI. 1902, p. 124.
Bodianus (*Aethaloperca*) *rogaa* Fowler, Journ. Acad. Nat. Sci. Philadelphia (2) XII. Prt. 4, 1904, p. 522.
Cephalopholis rogaa Fowler, Proc. Acad. Nat. Sci. Philadelphia LIX. part 2, 1907, p. 252.

D. IX. 17—18; A. III. 9; Sc. 100—115 $\frac{11-13}{43-48}$; l.l. 52—55.

Teeth forming rather broad bands, in three or four series on the sides of the mandible; canines moderate. Depth of body $2^{1}/_{4}$ to $2^{2}/_{3}$ times in total length, length of head 3 to $3^{1}/_{2}$ times. Nape much elevated, humped in old specimens; upper profile of head more or less concave; snout longer than diameter of eye, which is 5 to 7 times in length of head, and nearly equal to interorbital width; lower jaw projecting; maxillary extending to below posterior border of eye or a little beyond, the width of its distal extremity equal to, or exceeding diameter of eye; praeopercle very finely serrated, the serrae scarcely enlarged at the angle; middle opercular spine nearer lower than upper; opercular flap obtusely pointed, upper border sinuous; head entirely covered with cycloid scales. Gillrakers 9, and some rudiments on lower part of anterior arch, the longest longer than gill-fringes. Dorsal originating above base of pectorals: spines increasing in length to the third, which is slightly longer than the following, $^{1}/_{4}$ to $^{1}/_{3}$ length of head, and $^{2}/_{3}$ to $^{1}/_{2}$ length of longest soft rays; soft portion angulate posteriorly. Pectoral $^{2}/_{3}$ to $^{3}/_{4}$ length of head, asymmetrical, upper rays longest. Ventral as long as pectoral, reaching anus or beyond. Third anal spine a little longer than second, as long as fourth dorsal; soft anal rays as long as dorsals. Caudal truncate. Scales strongly ciliated. Dark brown or black; young with the dorsal tipped with white and a crescentic white border to the caudal. Total length 550 mm. [After Boulenger, not seen by us].

Habitat: Sumatra (Padang) [fide Steindachner]. — Red Sea, Zanzibar, Mouth of the Persian Gulf, Ceylon.

5. Epinephelus sonnerati (C.V.).

Serranus sonnerati Cuvier & Valenciennes, Hist. Nat. Poissons II. 1828, p. 299.
? *Serranus zananella* Cuvier & Valenciennes, t. c. p. 304.
Serranus erythraeus Playfair & Günther, Fishes of Zanzibar, 1866, p. 2. (nec C.V.).
Epinephelus janthinopterus Bleeker, Verh. Akad. Amsterdam XIV. N^0. 2, 1874, Révis. Epinephelini, p. 40. — Atl. ichth. VII. 1873—1876, p. 36.
Serranus sonnerati Day, Fishes of India 4°, 1878—1888, p. 25.
Epinephelus sonnerati Boulenger, Cat. Brit. Mus. 2nd. ed. 1895, p. 187.
Epinephelus sonnerati Steindachner, Denkschr. Akad. Wien LXXI. 1902, p. 124.
Epinephelus sonnerati Barnard, Ann. S. Afric. Mus. XXI. 1925—1927, p. 472.
Cephalopholis sonnerati Fowler, Fish. Oceania, Bernice P. Bishop Mus. Mem. X. 1928, p. 173.

D. IX. 15; A. III. 9; P. 2.17; V. I.5; L.l. 100—112; L. tr. $\begin{array}{c}11\text{—}14\\ \hline 1\\ \hline 48\text{—}50\end{array}$.

Height 2.9, 2.5—2.6, 3.1—3.2 in length with caudal. Head 3.1, 3.7—3.8 in length with caudal. Eye 5—6.5, shorter than snout. Interorbital space about four fifths of eye. Lower jaw projecting; mouth rather oblique, maxillary reaching to below posterior border of eye or a little beyond, the width of its distal extremity nearly equalling or exceeding diameter of eye. Praeoperculum very finely and evenly serrated, its angle rounded. Teeth forming rather broad bands, in three to five series on the sides of the mandible; canines moderate or strong. Middle opercular spine nearer lower than upper. Gillrakers 9 or 10 and 5 or 6 rudiments, on lower part of anterior arch, the longest about as long as gill-fringes. Dorsal originating above base of pectorals; spines increasing in length to the third, which is $^1/_4$ to $^1/_3$ length of head, and considerably shorter than posterior soft rays. Second and third anal spines subequal, as long as or little shorter than longest dorsal spine, $^1/_2$ to $^2/_3$ length of longest soft rays. Pectorals about as long as postorbital part of head, ventrals only a little shorter. Caudal rounded. Scales strongly ciliated. Colour of alcohol specimens light reddish brown, with a meshwork of darker brown on head and anterior part of back, indistinctly continued as light distant spots here and there on body and on vertical fins, which have a more or less distinct dark border. Often the head and body are uniformly dark brown in alcohol, with or without faint indications of dark lines on the head. Length 540 mm.

Habitat: Java; Borneo (Balikpapan!); Celebes (Makassar); Sanguisiapo!; Banda!. — From the coasts of Natal, South Arabia, British India, Ceylon, Nicobars, Philippines to Okinawa, eastwards to Australia, the Caroline and Friendly Islands.

6. **Epinephelus nigripinnis** (C.V.).

Serranus nigripinnis Cuvier & Valenciennes, Hist. Nat. Poisssons II. 1828, p. 339.
Epinephelus nigripinnis Boulenger. Cat. Brit. Mus. 2nd. ed. 1895, p. 188 (see synon.).

D. IX. 14—16; A. III. 9; P. 2.17—18; V. 1.5; Sq. l. 107—112; L. tr. $\dfrac{15}{\dfrac{1}{42\text{—}50}}$.

Height 2.6—2.7, 3—3.2 in length with caudal, head 2.6—2.9, 3—3.4 in length with caudal. Eye 4.5—6.2, shorter than snout. Interorbital space a little less or a little more than eye. Mouth rather oblique, lower jaw projecting, maxillary extending to below posterior border of eye or beyond, the width of its distal extremity not quite equalling diameter of eye. Teeth forming rather broad bands. Canines moderate. Praeoperculum very finely serrated, its angle rounded. Middle opercular spine nearer lower than upper. Opercular flap obtusely pointed, its upperborder convex. Head covered with cycloid scales. Gillrakers 9—11 and some rudiments on lower part of anterior arch, the longest about as long as gillfringes or somewhat longer. Dorsal originating above base of pectorals; spines increasing in length to the third or fourth, which is one third of head and much shorter than longest soft dorsal rays. Second anal spine somewhat longer than or equal to third spine, longer than soft rays. Pectorals equal to head without snout and excluding the opercular flap, ventrals as long as postorbital part of head. Caudal rounded. Scales strongly ciliated. Colour of alcohol specimens dark reddish brown, head often and sometimes part of body dotted with yellowish or bluish. Vertical fins with a darkbrown broad submarginal band, pectorals and ventrals darkbrown. Pectorals and caudal broadly edged with white. A large specimen, long 303 mm., is uniform dark brown, the soft dorsal has a narrow white edge and the pectorals are white in their distal fourth. The caudal is broken but probably had a light tip. Length 430 mm.

Nom. indig.: Entai (Tapah, Simalur).

Habitat: Sumatra (Simalur!, Padang); Flores; Batjan; Ambon; Banda!. — From the Mascarene Islands and the mouth of the Persian Gulf to the coast of China and the North coast of Australia.

7. **Epinephelus urodelus** (C. V.).

Bodianus miniatus Bloch, Schneider, Syst. ichth. 1801, p. 333 (part.).
Serranus urodelus Cuvier & Valenciennes, Hist. Nat. Poissons II. 1828, p. 306.
Serranus erythraeus Cuvier & Valenciennes, o. c. VI. 1830, p. 516.
Perca urodela Forster, Descr. Animal. 1844, p. 221.
Serranus urodelus Bleeker, Nat. Tijdschr. Ned. Indië VII. 1854, p. 39.
Serranus urodelus Brevoort, U. S. Japan. Exp. Nat. Hist. Washington 1856, p. 258.
Serranus erythraeus Günther, Cat. Brit. Mus. I. 1859, p. 116.
Serranus urodelus Günther, t. c. p. 122.
Serranus sonnerati Günther, ibid. (pro parte).
Epinephelus urodelus Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 232.
Serranus erythraeus Playfair & Günther, Fishes Zanzibar, 1866, p. 2.
Serranus sonnerati Playfair & Günther, l. c. p. 3. (nec C. V.).
Epinephelus miltostigma Bleeker, Verh. Akad. Amsterdam XIV. N⁰. 2, 1874, Révis. Epinephelini p. 43 — Atl. ichth. VII. 1873—1876, p. 37.
Epinephelus urodelus Bleeker, Atl. ichth. VII. 1873—1876, p. 41.
Senranus urodelus Günther, Fische der Südsee, I. 1873—1875, p. 3.
Epinephelus playfairi Bleeker, Verh. Akad. Amsterdam XVIII. 1879, Fauna Maurice, p. 2.
Epinephelus erythraeus Bleeker, l. c. p. 11 (name only).
Epinephelus erythraeus Sauvage, Poissons de Madagascar 1891, p. 57.
Epinephelus urodelus Boulenger, Cat. Brit. Mus. 2nd. ed. 1895, p. 192.
Epinephelus urodelus Waite, Mem. Austr. Mus. III. 1899, p. 181.
Epinephelus urodelus var. *urodelus* Steindachner, Abh. Senckenberg. Naturf. Ges. XXV. 1901, p. 413.
Cephalopholis urodelus Seale, Occas. Papers Bernice P. Bish. Mus. IV. 1906, p. 34.
Cephalopholis urodelus Jordan & Seale, Bull. Bur. Fish. Wash. XXV. (1905) 1906, p. 258.
Epinephelus urodelus M. Weber, Siboga Exp. Fische 1913, p. 200.
Cephalopholis urodelus Fowler, Fish. Oceania, Mem. Bernice P. Bishop Mus. X. 1928, p. 175.

D. IX. 14—16; A. III. 9; P. 1.16—18; V. 1.5; L.l. 93—102; L. tr. $\dfrac{\dfrac{9}{1}}{35\text{—}36}$.

Profile of head slightly convex. Height 2.9—3.1, 3.3—3.8 in length with caudal. Head 2.5—2.6, 3.1—3.2 in length with caudal. Eye 5—6, somewhat more or less than interorbital space and less than twice in snout. Lower jaw strongly projecting. Mouth slightly oblique; maxillary reaching beyond hindborder of eye, its width at distal extremity equal to or somewhat more than eye. Teeth forming rather narrow bands, the inner row of depressible teeth in the mandibles and those near symphysis of upper jaw very long and slender. An outer row of fixed teeth in both jaws, ending with a canine near symphysis. Praeoperculum very finely serrated, somewhat more coarsely serrated along the lower border. Praeopercular angle rounded. Opercular flap pointed. Middle opercular spine much nearer to lower than to upper one. Head, including snout and maxillaries covered with cycloid scales. Ten gillrakers and some rudiments on lower part of anterior arch, not as long as gillfringes. Dorsal originating above base of pectorals. Dorsal spines increasing in length to the third or fourth, which go 3.5 in head, much shorter than longest soft dorsal rays. Second anal spine longer and stronger than third one, much shorter than soft anal rays. Pectorals as long as head without snout, ventrals 1.5 eyediameter shorter. Caudal rounded. Scales ciliated. Colour of alcohol specimens brownish. Head, body and vertical fins more or less covered with light or dark dots. In the typical specimens the hinder part of the body, caudal peduncle and middle of caudal is dark brown. This dark part of the caudal is bordered by two oblique white bands, converging behind. In the variety *erythraeus* these dark parts as well as the white bands are absent. The anal has a longitudinal submarginal white band in the typical specimens as well as in the variety mentioned. Length 240 mm.

Habitat: Singapore!; Nias!; Cocos Island; Sumatra (Benkulen); Java (Patjitan); Celebes (Menado, Tanawanko, Tombariri); Sangir islands; Ternate; Obi; Binongka!; Ambon; Banda!; Misol; New Guinea (Doreh). — Madagascar, Mauritius, Zanzibar, Seychelles, Riu Kiu Islands, Japan, Philippines and Pacific islands eastwards to Society Islands. In sea.

8. **Epinephelus argus** (Bl. Schn.).

Bodianus guttatus Bloch, Ausl. Fische IV. 1790, p. 36 (nec *guttatus* L.).
Cephalopholis argus Bloch, Schneider, Syst. Ichth. 1801, p. 311.

Bodianus jacob-evertsen Lacépède, Hist. Nat. Poissons IV. 1802, p. 296 (part).

Serranus argus Cuvier & Valenciennes, Hist. Nat. Poissons II. 1828, p. 360.

Serranus luti Cuvier & Valenciennes, t. c. p. 363 (nec Forsk.).

Serranus myriaster Cuvier & Valenciennes, t. c. p. 365.

Serranus myriaster Rüppell, Atl. Fische Roth. Meer. 1828. p. 107.

Serranus myriaster Lesson, Voyage Coquille, Zoologie 1830, p. 234.

Serranus myriaster Quoy & Gaimard, Voyage Astrolabe, Poissons 1833, p. 653.

Serranus myriaster Richardson, Rep. Ichth. China, 15th meet. Brit. Ass. (1845) 1846, p. 233.

Serranus myriaster Bleeker, Nat. Tijdschr. Ned. Ind. VI. 1854, p. 192.

Serranus argus Günther, Cat. Brit. Mus. I. 1859, p. 115.

Serranus guttatus Günther, l. c. p. 119.

Epinephelus guttatus Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 232.

Serranus argus Peters, Monatsber. Akad. Berlin 1865, p. 103.

Serranus guttatus Kner, Novara-Exp. Fische 1865—67, p. 22.

Serranus guttatus Klunzinger, Abh. zool. bot. Ges. Wien XX. 1870, p. 686 — Fische des Rothen Meeres I. 1884, p. 3.

Serranus guttatus Günther, Fische der Südsee I. 1873—1875, p. 5.

Epinephelus argus Bleeker, Verh. Akad. Amsterdam XIV. N^0. 2, 1874, Révis. Epinephelini. p. 57. — Atl. ichth. VII. 1873—1876, p. 43.

Serranus guttatus Day, Fishes of India 4^0, 1878—1888, p. 24.

Serranus guttatus Macleay, Descr. Cat. Austr. Fish. I. 1881, p. 15.

? *Serranus perguttatus* De Vis, Proc. Linn. Soc. N. S. Wales VIII. 1883, p. 445.

Epinephelus argus Sauvage, Poissons Madagascar 1891, p. 54.

Serranus guttatus Picaglia, Atti Soc. de Modena (3) XIII. 1894, p. 24.

Epinephelus argus Boulenger, Cat. Brit. Mus. 2nd. ed. 1895, p. 189.

Cephalopholis argus Jordan & Evermann, Bull. U. S. Fish. Comm. XXIII. (1903) 1905, p. 221.

Cephalopholis argus Jordan & Seale, Bull. Bureau Fish. XXV. (1905) 1906, p. 258.

Epinephelus argus Steindachner, Sitzb. Akad. Wien CXV. Abt. I. 1906, p. 1377.

Cephalopholis argus Fowler, Proc. Acad. Nat. Sci. Philad. LIX. part 2, 1907, p. 252.

Cephalopholis argus Jordan & Richardson, Bull. Bur. Fish. Wash. XXVII. (1907) 1908, p. 256.

Cephalopholis argus Kendall & Goldsborough, Mem. Mus. Comp. Zool. Harvard Coll. XXVI. 1911, p. 284.

Epinephelus argus Barnard, Ann. S. Afric. Mus. XXI. 1925—1927, p. 473.

Cephalopholis argus Fowler, Fish. Oceania, Mem. Bernice P. Bishop Mus. X. 1928, p. 174.

D. IX. 1) 15—17; A. III. 8 (9); P. 1.16—17; V. I. 5; L.l. 93—98; L. tr. $\begin{array}{c}10\\ \hline 1\\ \hline 39-40\end{array}$.

Height 2.8—3, 3.5—3.6 in length with caudal. Head 2.4—2.5, 3—3.1 in length with caudal. Eye 5.1—6.6, equal to or more

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1) One specimen from Lombok in our collection has D. VIII, but this is an abnormality, the fin having apparently been injured when the fish was young.

than (in large specimens) interorbital space and twice or less in snout. Lower jaw strongly projecting. Mouth oblique, maxillary reaching to vertical through hindborder of eye in large specimens, in smaller ones beyond this line. Width of distal extremity of maxillary equal to or more than diameter of eye. Teeth in jaws long and slender, forming rather broad bands. An outer row of fixed teeth in the upper jaw, ending near symphysis at each side with a canine. A similar pair of canines in the lower jaw. Praeoperculum very finely serrated, almost smooth in large specimens. Middle opercular spine much nearer to lower than to upper one. Head, including snout and maxillary, covered with small cycloid scales. Gillrakers 9 and a few rudiments in front, on lower part of anterior arch, the longest about equal to gillfringes. Dorsal originating above base of pectorals. Spines increasing in length to the fourth or fifth, which go twice or less than twice in postorbital part of head, much shorter than posterior soft dorsal rays. Second anal spine stronger and somewhat longer than third spine, much shorter than soft anal rays. Pectorals equal to postorbital part of head. Ventrals one eye-diameter shorter. Caudal rounded. Scales moderately ctenoid. Colour brownish, head, body and fins covered by dark brown spots, with a light bluish centre in the middle, disappearing in alcohol. Posterior part of body sometimes with dark vertical bands. Length 430 mm.

Nom. indig.: Kerapo (Malay. Batavia).

Habitat: Singapore; Batu islands; Nias; Sumatra (Padang, Ulakan, Priaman); Java (Batavia, Patjitan); Lombok!; Borneo; Celebes (Makassar!, Kema, Menado); Sangir islands; Ternate; Buru; Ceram; Ambon; Batjan; Goram; Timor; Waigeu; New Guinea. — From Madagascar, east coast of Africa, Red Sea, coasts of British India to China, Philippines, North Australia and Pacific islands eastwards to the Paumotu islands. In sea.

9. **Epinephelus miniatus** (Forsk.).

Perca miniata Forskål, Descr. Animalium 1775, p. 41.
Pomacentrus burdi Lacépède, Hist. Nat. Poissons IV. 1802, p. 511.
Diacope miniata Cuvier & Valenciennes, Hist. Nat. Poissons II. 1828, p. 433.
Serranus miniatus Rüppell, Atl. Fische Roth. Meeres, 1828, p. 10.
Cromileptes miniatus Swainson, Nat. Hist. Fishes 1839, II. p. 201.
Serranus cyanostigmatoides Bleeker, Verh. Bat. Gen. XXII. 1849, Percoiden, p. 31.
Serranus miniatus Günther, Cat. Brit. Mus. I. 1859, p. 118.

Epinephelus cyanostigmatoides Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 232.
Serranus miniatus Klunzinger, Abh. zool. bot. Ges. Wien XX. 1870, p. 679. — Fische d. Rothen Meeres 1884, p. 4.
Serranus miniatus Günther, Fische d. Südsee 1873—75, p. 5.
Epinephelus miniatus Bleeker, Atl. ichth. VII. 1873—1876, p. 41.
Serranus miniatus Day, Fishes of India 4^0, 1878—1888, p. 24.
Serranus cyanostigmatoides Perugia, Ann. Mus. Civ. Genova (2) VII. 1889, p. 269.
Epinephelus miniatus Sauvage, Poissons Madagascar 1891, p. 52.
Epinephelus miniatus Boulenger, Cat. Brit. Mus. 2nd. ed. 1895, p. 191.
Cephalopholis miniatus Seale, Occ. Papers B. P. Bishop Mus. IV. 1906, p. 35.
Cephalopholis miniatus Jordan & Seale, Bull. Bur. Fish. XXV. (1905) 1906, p. 258.
Epinephelus miniatus Pellegrin, Bull. Mus. Hist. Nat. Paris 1907, p. 204.
Cephalopholis miniatus Fowler, Proc. Acad. Nat. Sci. Philad. LIX. Prt. 2, 1907, p. 252.
Cephalopholis miniatus Jordan & Richardson, Bull. Bur. Fish. XXVII. (1907) 1908 p. 256.
Epinephelus miniatus Barnard, Ann. S. Afric. Mus. XXI, 1925—27, p. 474.
Cephalopholis miniatus Fowler, Fish. Oceania, Mem. Bernice P. Bish. Mus. X. 1928, p. 175.

D. IX. 15—16; A. III. 9; P. 1.17; V. I. 5; L.l. 104—105; L. tr. $\begin{array}{c}9\\ \hline 1\\ \hline 30\end{array}$.

Height 2.7—2.9, 3.3—3.6 in length with caudal. Head 2.2—2.5, 2.8—3.1 in length with caudal. Eye 5.6—6.6, 1.4—2 in snout and equal to or a little more than interorbital space. Lower jaw strongly projecting. Mouth oblique, maxillary reaching to below posterior border of eye or beyond, the width of its distal extremity nearly equal to diameter of eye. Praeoperculum evenly serrated, its angle rounded. Middle opercular spine nearer to lower than to upper one. Opercular flap obtusely pointed, the upper border strongly curved. Teeth forming rather narrow bands in jaws, the inner row of depressible teeth in the mandibles and those near symphysis of upper jaw long and slender. An outer row of fixed teeth in the upper jaw, ending near symphysis at each side with one or two canines of moderate length. Similar canines in the lower jaw. Head including maxillaries, covered with cycloid scales. Gillrakers 10 and several rudiments, on lower part of anterior arch. Dorsal originating above base of pectorals. Spines increasing in length to the third, which goes three times in head. Posterior soft rays much longer. Second and third anal spine subequal, much shorter than longest soft anal rays. Pectorals as long as postorbital part of head, ventrals one eye diameter shorter. Caudal rounded. Scales ciliated. Colour of alcohol specimens lighter or darker brown, head, body, caudal, dorsal and anal covered with dark spots, with a light bluish centre, which disappears often in alcohol. Pectorals and ventrals without or with a few spots only. Length 410 mm.

Nom. indig.: Kerapo-karang (Malay. Batavia).

Habitat: Pulu Weh!; Nias!; Sumatra (Padang, Ulakan); Java (Batavia); Celebes (Makassar, Kema); Talaut islands!; Saleyer!; Flores; Solor; Rotti!; Damar!; Banda!; Tiur!; Buru; Ceram; Ambon; Batjan; Ternate; Obi; Waigeu; New Guinea (Wilhelmsland!). — From Madagascar and east coast of Africa, Red Sea, coasts of British India to Philippines, Solomon Islands, New Britain and Samoa. In sea.

10. **Epinephelus aurantius** (C. V.).

Serranus aurantius Cuvier & Valenciennes, Hist. Nat. Poissons II. 1828, p. 305.
? *Serranus roseus* Cuvier & Valenciennes, t. c. p. 306.
Serranus analis Cuvier & Valenciennes, t. c. p. 307 and VI. 1830, p. 514.
Serranus analis Lesson, Voyage Coquille Zool. II. 1830, p. 235.
Serranus rufus Hombron & Jacquinot, Voyage Pôle Sud, Zool. III. Poissons 1853, p. 35.
Serranus aurantiacus ¹) Bleeker. Nat. Tijdschr. Ned. Ind. XVI. 1858—1859, p. 424.
Serranus sonnerati Günther, Cat. Brit. Mus. I. 1859, p. 122 (pro parte).
Epinephelus aurantius Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 232. — Atl. ichth. VII. 1873—1876, p. 37.
Epinephelus analis Bleeker, Atl. ichth. VII. 1873—1876, p. 38.
Serranus leopardus Günther, Fische d. Südsee I. 1873—1875, p. 4 (pro parte).
Epinephelus aurantius Sauvage, Poissons Madagascar 1891, p. 60.
Epinephelus aurantius Boulenger, Cat. Brit. Mus. 2nd. ed. I. 1895, p. 193.
Bodianus indelebilis Fowler, Journ. Acad. Nat. Sci. Philadelphia (2) XII. part 4, 1904, p. 521.
Cephalopholis aurantius Jordan & Seale, Bull. Bur. Fish. Wash. XXV. (1905) 1906, p. 258.
Cephalopholis aurantius indelebilis Fowler, Proc. Acad. Nat. Sci. Philad. LIX. Prt. 2, 1907, p. 252. — Fish. Oceania, Mem. Bernice P. Bish. Mus. X. 1928, p. 175.

D. IX. 14—15; A. III. 8—9; P. I. 14—16; V. I. 5; L.l. 81; L. tr. $\begin{array}{c}8-10\\ \hline 1\\ \hline 34\end{array}$.

Height 2.6, 3.2 in length with caudal. Head 2.1, 2.6 in length with caudal. Eye 6, more than interorbital space and somewhat less than snout. Lower jaw strongly projecting. Mouth somewhat oblique, maxillary reaching beyond posterior

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1) Misprint for *aurantius*.

border of eye, its width at distal extremity equal to eye. Praeoperculum finely serrated behind, its angle rounded. Opercular flap pointed. Middle opercular spine slightly nearer to lower than to upper one. Teeth forming rather broad bands, the inner row of depressible teeth in the lower jaw and those near symphysis of upper jaw very long and slender. An outer row of fixed teeth in both jaws, ending near symphysis with a canine. Head covered with cycloid scales, very small or absent on maxillaries. Gillrakers 6 and some rudiments, on lower part of anterior arch, the longest not quite as long as gill-fringes. Dorsal originating above base of pectorals, spines increasing in length to the third, which is $^1/_3$ of head and much shorter than soft dorsal rays. Second anal spine stronger and slightly longer than third one, shorter than soft anal rays. Pectorals almost as long as postorbital part of head, ventrals as long as eye and snout, including mandibles. Caudal rounded. Scales strongly ciliated. Brownish or yellowish in alcohol, with or without blue dots on head and anterior part of back. Vertical fins sometimes with a black edge. Length 300 mm.

Habitat: Sumatra (Padang, Benkulen, Siboga); Java (Anjer); Celebes (Makassar Menado); Ternate; Batjan; Banda!; New Guinea (Doreh). — Madagascar, Bourbon, Seychelles, South Arabia, New Ireland, Louisiade Archipelago. In sea.

11. **Epinephelus leopardus** (Lac.).

Labrus leopardus Lacépède, Hist. Nat. Poissons III. 1802, p. 517.
Serranus leopardus Cuvier & Valenciennes, Hist. Nat. Poissons II. 1828, p. 336.
Serranus zanana Cuvier & Valenciennes, t. c. p. 339.
Serranus spilurus Cuvier & Valenciennes, o. c. IX. 1833, p. 433.
Serranus spilurus Bleeker, Nat. Tijdschr. Ned. Indië VI. 1854, p. 322.
Serranus zanana Günther, Cat. Brit. Mus. I. 1859, p. 123.
Epinephelus spilurus Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 232.
Serranus homfrayi Day, Proc. Zool. Soc. London 1870, p. 678.
Serranus leopardus Günther, Fische d. Südsee 1873—1875, p. 4.
Epinephelus leopardus Bleeker, Verh. Akad. Amsterdam XIV. N⁰. 2, 1874, p. 61. — Atl. ichth. VII. 1873—1876, p. 44.
Serranus leopardus Day, Fishes of India 4⁰, 1878—1888, p. 25.
Epinephelus leopardus Sauvage, Poissons Madagascar 1891, p. 57.
Epinephelus leopardus Boulenger, Cat. Brit. Mus. 2nd. ed. I. 1895, p. 195.
Epinephelus leopardus Waite, Mem. Austral. Mus. III. 1899, p. 181.
Epinephelus leopardus Steindachner, Abh. Senckenberg. naturf. Ges. XXV. 1901, p. 414.
Cephalopholis leopardus Jordan & Seale, Bull. Bur. Fish. Wash. XXV. (1905) 1906, p. 258.

Cephalopholis leopardus Jordan & Richardson, l. c. XXVII. (1907) 1908, p. 256.
Cephalopholis leopardus Fowler, Fish. Oceania, Mem. Bernice P. Bish. Mus. X. 1928, p. 176.

D. IX. 14—15; A. III. 9; P. 1.15—16; V. I.5; L.l. 72—87; L. tr. $\frac{\frac{6-7}{1}}{31-34}$.

Height 2.7—3.2, 3.3—3.6 in length with caudal. Head 2.3—2.8, 2.7—3.1 in length with caudal. Eye 4.7—5, somewhat less than snout. Interorbital space four fifths of eye. Lower jaw strongly projecting. Mouth somewhat oblique, maxillary reaching beyond posterior border of eye, the width of its distal extremity equal to diameter of eye. Praeoperculum very finely serrated behind, its angle rounded. Opercular flap pointed. Middle opercular spine slightly nearer to lower than to upper one. Teeth forming rather broad bands, the inner row of depressible teeth in the lower jaw and those near symphysis in upper jaw very long and slender. An outer row of fixed teeth in both jaws, ending near symphysis with a canine. Head covered with cycloid scales, snout and maxillary entirely or partially scaly. Gillrakers 10 on lower part of anterior arch, somewhat shorter than gill-fringes. Dorsal originating above base of pectorals, spines increasing in length to the fourth or fifth, which is about one third of head and considerably shorter than longest soft dorsal rays. Second anal spine stronger and longer than third, somewhat shorter than soft anal rays. Pectorals half eye-diameter less than head without snout. Ventrals shorter than postorbital part of head. Caudal rounded. Colour of alcohol-specimens brownish, head more or less spotted with light yellowish. A dark broad band, running from the eye to the point of the opercular flap and ending there with a still darker patch, is often present. A dark patch on the back of the tail, often followed by a smaller one. Anal with a submarginal black band. Caudal with two oblique dark bars, converging posteriorly or united into a crescentic band. Length 195 mm.

Habitat: Sumatra (Benkulen); Java (Anjer); North Celebes; Sangir islands; Ternate; Batjan; Ambon; Banda!; Flores; Kei islands!. — Mauritius, Mascarene Islands, Coasts of British India, Adamans, China?, Philippines, eastwards to Friendly islands. In sea.

12. Epinephelus flavocaeruleus (Lac.).

Holocentrus flavocaeruleus Lacépède, Hist. Nat. Poissons IV. 1802, p. 367.
Holocentrus gymnosus Lacépède, t. c. p. 372.
Bodianus macrocephalus Lacépède, l. c. III. 1802, p. 293.
Serranus borbonicus Quoy & Gaimard, Voyage de l'Uranie et de la Physicienne 1824, p. 312.
Serranus flavocaeruleus Cuvier & Valenciennes, Hist. Nat. Poissons II. 1828, p. 297.
Perca flavopurpurea Bennett, Fishes of Ceylon 1841, pl. XIX.
Serranus hoedti Bleeker, Nat. Tijdschr. Ned. Indië VIII. 1855, p. 406.
Serranus punctatissimus Günther, Cat. Brit. Mus. I. 1859, p. 144.
Serranus flavo-caeruleus Günther, l. c. p. 145.
Epinephelus hoedti Bleeker, Ned. Tijdschr. Dierk. II. 1865, p. 281. — Atl. ichth. VII. 1873—1876, p. 45.
Serranus flavo-caeruleus Playfair & Günther, Fishes of Zanzibar, 1866, p. 10.
Serranus hoedti Günther, Fische d. Südsee 1873—1875, p. 9.
Epinephelus flavocaeruleus and vars. *melanometopon* and *xanthometopon* Bleeker, Rech. s. l. Faune de Madagascar, Poissons, 1875, p. 17.
Serranus flavo-caeruleus Day, Fishes of India 4⁰, 1878—1888, p. 15.
Serranus hoedti Macleay, Proc. Linn. Soc. N. S. Wales VII. 1882, p. 226.
Serranus flavo-caeruleus Perugia, Ann. Mus. Civ. Genova (2) VII. 1889, p. 270.
Epinephelus flavo-caeruleus Sauvage, Poissons de Madagascar, 1891, p. 62.
Epinephelus flavocaeruleus Boulenger, Cat. Brit. Mus. 2nd. ed. 1895, p. 198.
Epinephelus hoedti Jordan & Evermann, Proc. U. S. Nat. Mus. XXV. 1902, p. 342.
Epinephelus flavocaeruleus var. *flavocaeruleus* Steindachner, Denkschr. Akad. Wien LXXI. 1902, p. 125.
Epinephelus macrocephalus Jordan & Seale, Bull. Bur. Fish. Wash. XXV. (1905) 1906, p. 259.
Epinephelus hoedtii Ogilby, Mem. Queensland Museum I. 1912, p. 50.
Epinephelus flavocaeruleus Ogilby, ibid.
Epinephelus flavocaeruleus var. *hoedtii* Mc Culloch, Check-list of fish & fishlike animals of N. S. Wales, Part II. 1919, p. 46.
Epinephelus flavocaeruleus Barnard, Ann. S. Afric. Mus. XXI. 1925—1927, p. 475.
Serranus flavo-caeruleus Fowler, Fish. Oceania, Mem. Bernice P. Bishop Mus. X. 1928, p. 177.

D. XI. 17; A. III. 8 (9); P. 1.17; V. I. 5; L.l. 125; L. tr. $\begin{array}{c}16—17\\ \hline 1\\ \hline 58\end{array}$.

Height 2.4—2.7, 3—3.2 in length with caudal. Head 2.5—2.6, 3.1 in length with caudal. Eye 5.9, less than interorbital space and 1.6 in snout. Lower jaw somewhat projecting. Mouth oblique, maxillary reaching to behind hindborder of eye, the width of its distal extremity three fifths of diameter of eye. Teeth in narrow bands, depressible teeth of mandibles and of symphysis of upper jaw enlarged, not much longer than the outer row of fixed teeth. Canines small. Praeoperculum coarsely serrated, some enlarged serrae near its angle, which is obtusely rounded. Middle opercular spine about midway between the upper and lower ones, which are much smaller, especially the upper one. Opercular flap pointed. Head, including maxillary, covered with cycloid scales. Gillrakers nearly as long as gill-fringes, 14—15 and some rudiments on lower part of anterior arch. Dorsal originating above base of pectorals; third or fourth spine longest, 2.5 in head, as long as or somewhat shorter than longest soft rays and much longer than last dorsal spine. Second anal spine a little shorter than third one, equal to second anal spine. Pectorals equal to distance between eye and middle opercular spine. Ventrals somewhat longer. Caudal truncate or slightly emarginate. Scales ciliated. Head and body of alcohol-specimens dark violet, caudal peduncle, fins and lips yellowish. Base of dorsal and anal violet as the body. Caudal, soft anal and ventrals tipped with black. Head, body and fins may be dotted with black. The black borders of the fins may be wanting or more developed. The violet of the base of the dorsal and anal may also be more developed, leaving only a yellow border. Length 460 mm.

Habitat: Sabang!; Nias; Celebes (Makassar); Ambon; New Guinea. — From Madagascar, east coast of Africa, Seychelles, South Arabia, Ceylon, coasts of British India, Formosa, China, coast of Queensland and New South Wales, Kingsmill islands, Mortlock island, Ponape, Rodriguez. In sea.

13. **Epinephelus undulosus** (Q. G.).

Bodianus undulosus Quoy & Gaimard, Voyage de l'Uranie et de la Physicienne, 1824, p. 310.

Serranus lineatus Cuvier & Valenciennes, Hist. Nat. Poissons II. 1828, p. 312.

Serranus amboinensis Bleeker, Nat. Tijdschr. Ned. Indië III. 1852, p. 258.

Serranus lineatus Günther, Cat. Brit. Mus. I. 1859, p. 156.

Serranus amboinensis Günther, ibid.

Epinephelus amboinensis Bleeker, Ned. Tijdschr. Dierk. II. 1865, p. 281.

Epinephelus lineatus Bleeker, Ned. Tijdschr. Dierk. IV. 1873, p. 138.

Epinephelus undulosus Bleeker, Verh. Akad. Amsterdam XIV. N⁰. 2, 1874, p. 65. — Atl. ichth. VII. 1873—1876, p. 46.

Serranus undulosus Day, Fishes of India 4⁰. 1878—1888, p. 13.

Epinephelus undulosus Boulenger, Cat. Brit. Mus. 2nd. ed. 1895, p. 199.

Serranus undulosus Fowler, Fish. Oceania, Mem. Bernice P. Bishop Mus. X. 1928, p. 177.

D. XI. 18—19; A. III. 8 (9); P. 1.17; V. I. 5; L.l. 127; L. tr. $\begin{array}{c}17\\ \hline 1\\ \hline 56\end{array}$.

Height 2.8, 3.5 in length with caudal. Head 2.5, 3.1 in length with caudal. Eye 5.4, equal to interorbital space and 1.5 in snout. Lower jaw projecting. Mouth oblique, maxillary reaching about to below posterior border of eye, the width of its distal extremity 1.6 in diameter of eye. Teeth in narrow bands, the inner depressible series in the mandibles and those near symphysis in upper jaw slightly longer than the others. An outer row of fixed teeth in both jaws, ending in a rather well developed but short canine. Praeoperculum evenly serrated behind, the angle, which is more or less produced, with 2 to 5 strong teeth. Middle opercular spine slightly nearer to lower than to upper one, which last is very small. Gillrakers long and slender, longer than gill-fringes, about 20 and some rudiments on lower part of anterior arch. Dorsal originating above base of pectorals; second spine slightly shorter than third and fourth, which are the longest and more than one third of length of head, as long as or longer than soft dorsal rays, much longer than last dorsal spine. Second anal spine somewhat shorter than third, which is shorter than second dorsal spine and much shorter than longest soft anal rays. Pectorals equal to postorbital part of head. Ventrals somewhat longer. Caudal truncate or sligthly emarginate. Scales ciliated. Colour of alcohol-specimens brownish violet, lighter below. Head with longitudinal series of dark brown spots, confluent into wavy lines on upper part of body and tail. Vertical fins and ventrals brownish, with an indication of a broad marginal dark band. Pectorals light yellowish. Length 360 mm.

Habitat: Celebes (Makassar); Saleyer!; Ambon; Misool; Waigeu. — From sea of Oman, coasts of British India, Ceylon, China, Philippines, Shortland island.

14. **Epinephelus areolatus** (Forsk). [Fig. 5. p. 14].

Perca areolata Forskål, Descript. Animal. 1775, p. 42.
Bodianus melanurus Geoffroy, Descript. Egypte, Poissons 1809, p. 317.
Serranus melanurus Geoffroy, l. c. p. 319.
Serranus melanurus Cuvier & Valenciennes, Hist. Nat. Poissons II. 1828, p. 351.
Serranus angularis Cuvier & Valenciennes, t. c. p. 353.
Serranus celebicus Bleeker, Nat. Tijdschr. Ned. Indië II. 1851, p. 217.

Serranus celebicus Günther, Cat. Brit. Mus. I. 1859, p. 139.
Epinephelus celebicus Bleeker, Ned. Tijdschr. Dierk. II. 1865, p. 281. — Verh. Akad. Amsterdam XIV. 1874, p. 69.
Serranus celebicus Klunzinger, Abh. zool. bot. Ges. Wien XX. 1870, p. 676.
Serranus glaucus Day, Proc. Zool. Soc. London 1870, p. 678.
Epinephelus angularis Bleeker, Atl. ichth. VII. 1873—1876, p. 48.
Serranus celebicus von Martens, Exp. nach Ost-Asien, Zoöl. Th. I. 1876, p. 386.
Serranus angularis Day, Fishes of India, 4^0, 1878—1888, p. 22.
Serranus angularis Steindachner & Döderlein, Denkschr. Akad. Wien XLVII. 1883, p. 232.
Serranus (*Hyposerranus*) *areolatus* Klunzinger, Fische d. Rothen Meeres 1884, p. 3.
Epinephelus angularis Sauvage, Poissons de Madagascar, 1891, p. 71.
Epinephelus areolatus Boulenger, Cat. Brit. Mus. 2nd. ed. 1895, p. 202.
Epinephelus areolatus Fowler & Bean, Proc. U. S. Nat. Mus. LXII. 1922, p. 29

D. XI. 15—16 (17); A. III. 8; P. 1.17; V. I. 5; L.l. 104—112; L. tr. $\begin{array}{c}12\text{—}13\\ \hline 1\\ \hline 41\text{—}45\end{array}$.

Height 3—3.4, 3.8—4.4 in length with caudal. Head 2.6, 3.2—3.4 in length with caudal. Eye 5—5.4, equal to or somewhat more than interorbital space, 1.1—1.3 in snout. Lower jaw rather strongly projecting. Mouth slightly oblique, maxillary reaching to below centre or posterior border of eye, the width of its distal extremity 1.5—1.8 in diameter of eye. Teeth in narrow bands, the inner series of depressible teeth in the mandibles and those near symphysis in the upper jaw rather longer than the others. An outer row of fixed teeth in both jaws ending in a moderate canine near symphysis. Praeoperculum evenly serrated behind, its angle produced and provided with 3—7 enlarged spines. Opercular spines nearly equidistant, the upper one very small. Gillrakers as long as gill-fringes, 13 and some rudiments on lower part of anterior arch. Dorsal originating above base of pectorals, fourth spine longest, much longer than last dorsal spine, longer than longest soft dorsal rays and about 2.5 in head. Second anal spine as long as, or slightly longer than third, shorter than second dorsal spine and than longest soft anal rays. Pectorals and ventrals subequal, as long as postorbital part of head. Caudal emarginate, the lobes pointed. Colour of alcohol-specimens light yellowish or reddish, head, body and fins covered by numerous large darker spots. Soft dorsal, anal and caudal with a blackish margin edged at both sides with whitish. Length 380 mm.

Habitat: Sabang!; Singapore; Sumatra (Priaman, Tapa tuan); Nias!; Banka; Java (Batavia); Celebes (Makassar!, Bulucomba, Menado, Kema); Sulu islands!; Bali; Sumbawa; Flores!; Ambon; Batjan. — Madagascar, east coast of Africa, Red Sea, coasts of British India, Ceylon, Philippines, Formosa, Japan. In sea.

15. Epinephelus chlorostigma (C.V.).

Serranus tauvina Geoffroy, Descr. Egypte, Poissons 1809, p. 317 (nec Forsk.).
Serranus areolatus Cuvier & Valenciennes, Hist. Nat. Poissons II. 1828, p. 350 (nec Forsk.).
Serranus chlorostigma Cuvier & Valenciennes, t. c. p. 352.
Serranus Waandersi Bleeker, Nat. Tijdschr. Ned. Indië XVII. 1858—1859, p. 152.
Serranus areolatus Klunzinger, Abh. zool. bot. Ges. Wien XX. 1870, p. 675 (nec Forsk.).
Serranus (*Hyposerranus*) geoffroyi Klunzinger, ibid.
Epinephelus Waandersi Bleeker, Verh. Akad. Amsterdam XIV. N⁰. 2, 1874, p. 68. — Atl. ichth. VII. 1873—1876, p. 47.
Serranus celebicus var. *multipunctatus* Kossmann & Räuber, Verh. Naturh. Verein Heidelberg, I. 1876, p. 10.
Serranus areolatus Day, Fishes India 4⁰, 1878—1888, p. 12. Suppl. 1888, p. 780 (nec Forsk.).
Serranus (*Hyposerranus*) geoffroyi Klunzinger, Fische Rothen Meeres 1884, p. 3.
Serranus assabensis Giglioli, Ann. Mus. Genova (2) VI. 1888, p. 68.
Epinephelus chlorostigma Sauvage, Hist. Nat. Madagascar Poissons 1891, p. 73.
Epinephelus areolatus Sauvage, l. c. p. 74 (nec Forsk.).
Epinephelus chlorostigma Boulenger, Cat. Brit. Mus. 2nd. ed. 1895, p. 203.
Epinephelus chlorostigma Steindachner, Denkschr. Akad. Wien LXXI, 1902, p. 125.
Epinephelus chlorostigma Jordan & Evermann, Proc. U. S. Nat. Mus. XXV. 1902, p. 341.
Epinephelus chlorostigma Jordan & Richardson, l. c. XXXVII. 1910, p. 446.
Epinephelus chlorostigma Jordan, Tanaka & Snyder, Journ. Coll. Science Univ. Tokyo XXXIII. Art. 1, 1913, p. 153.

D. XI. 16; A. III. 8; P. 1.16; V. I. 5; L.l. ± 135; L. tr. $\begin{array}{c}16\\\hline 1\\\hline 53\end{array}$.

Height 2.9, 3.8 in length with caudal. Head 2.5, 3.3 in length with caudal. Eye 4.9, 1.2 in snout. Interorbital space about two thirds of eye-diameter. Maxillary scaly, reaching to below middle of eye, the width of its distal extremity 1.6 in eye. Praeoperculum rectangular, somewhat produced at angle, the serrae at angle somewhat enlarged. Flap of operculum pointed. Opercular spines about equidistant, the lower one in the same vertical as the upper one. Gillrakers 13 and some rudiments on lower part of anterior arch. Teeth in two series on the sides of the mandibles. Dorsal originating above base of pectorals. Fourth dorsal spine longest, one third of length of head. Last dorsal spine only slightly shorter. Longest soft dorsal rays somewhat longer than longest spine. Second and third anal spine subequal, about one fourth of length of head. Longest soft anal rays longer than largest soft dorsal rays. Ventrals equal to postorbital part of head, pectorals half eye-diameter longer. Caudal truncate. Scales of head cycloid, of body and tail ctenoid. Colour of alcohol-specimen brown with a meshwork of lighter, extending on fins. Soft dorsal and anal and caudal with a light border. [Description made after the type specimen of *E. Waandersi* long 245 mm., seen by us in the Leiden Museum]. Length 630 mm.

Habitat: Bali!. — Madagascar, Seychelles, Zanzibar, Red Sea, South Arabia, Persian Gulf, coasts of British India, Formosa, China, Japan, Philippines.

Note: The type of *E. Waandersi* is the only specimen of this species, which has been found in the indo-australian Archipelago.

16. **Epinephelus bleekeri** (Vaill. & Bocourt).

Serranus variolosus Bleeker, Verh. Bat. Gen. XXII. Perc. 1849 p. 35, (nec C.V.).
Serranus longispinis Playfair & Günther, Fishes Zanzibar, 1866, p. 10 (pro parte).
Epinephelus dayi Bleeker, Atl. ichth. VII. 1873—1876, p. 47 (non Bleeker olim).
Epinephelus variolosus Bleeker, l. c. p. 48 (nec C. V.).
Serranus bleekeri Vaillant & Bocourt, Mission scient. Mexique, Poissons 1877, p. 69.
Serranus waandersi Day, Fishes of India 4⁰, 1878—1888, p. 12.
Serranus coromandelicus Day, o. c. Suppl. 1888, p. 746.
Serranus coromandelicus Boulenger, Proc. Zool. Soc. London 1889, p. 237.
Epinephelus coromandelicus Boulenger, Cat. Brit. Mus. 2nd. ed. I. 1895, p. 204.
Epinephelus bleekeri Boulenger, t. c. p. 212.
Epinephelus coromandelicus M. Weber, Siboga-Exp. Fische 1913, p. 202.

D. XI. 16—17; A. III. 8; P. 1.16; V. I. 5; L.l. 107; L. tr. $\begin{array}{c}15-16\\ \hline 1\\ \hline 40\end{array}$.

Height 3—3.5, 3.6—4.3 in length with caudal. Head 2.5—2.7, 3—3.3 in length with caudal. Eye 4.4—6.1, equal to or a little more than interorbital space and 1.2—1.6 in snout. Lower jaw rather strongly projecting. Mouth somewhat oblique, maxillary reaching almost to below hindborder of eye, the width at its distal extremity three fourths of eye. Angle of praeoperculum obtuse, slightly projecting, with enlarged serrae.

Hindborder of praeoperculum finely serrated. Middle opercular spine nearly equidistant from lower and upper one. Lower spine further back than upper, which is very small. Teeth in narrow bands, the fixed teeth of the outer row longer than the flexible ones, which last are only enlarged near symphysis of upper jaw. Canines moderate. Gillrakers nearly as long as gill-fringes, 16 in lower part of anterior arch. Head, including maxillary, covered with cycloid scales. Dorsal originating above base of pectorals, fourth spine longest, 2.5 in head, as long as longest soft dorsal rays. Second anal spine a little shorter than third, shorter than second dorsal spine and than longest soft anal rays. Pectorals equal to or somewhat more than distance between eye and point of middle opercular spine. Ventrals somewhat shorter. Scales ciliated. Caudal truncate. Colour of alcohol-specimens reddish brown, head with light spots or unspotted. Body and tail, as well as soft dorsal and upper part of caudal with rows of large dark spots. Ventrals dark at tip. Lower half of caudal dark brown, contrasting more or less with the upper half. A dark stripe above maxillary, more conspicuous in the young. Length 664 mm.

Nom. indig.: Kerapo-tutol (Malay. Batavia); Balong (Javanese).

Habitat: Singapore; Sumatra (Padang, Ulakan); Nias!; Biliton; Java (Batavia, Bantam, Semarang, Japara, Surabaya, Besuki, Tjilatjap); Madura; Bali; Celebes (Badjoa); Buru; Ambon; Kei islands!. — Mauritius, Persian Gulf, coasts of British India, Siam, China.

17. **Epinephelus diacanthus** (C.V.).

Serranus diacanthus Cuvier & Valenciennes, Hist. Nat. Poissons II. 1828, p. 319.

Serranus nebulosus Richardson, Report Ichthyol. China 15th meet. Brit. Ass. (1845) 1846, p. 232 (nec C. V.).

Serranus trimaculatus Bleeker, Acta Soc. Scient. Indo-Neerl. III. N⁰. 9, 1858, Fauna Japan, p. 8.

Serranus sexfasciatus Günther, Cat. Brit. Mus. I. 1859, p. 108.

Serranus diacanthus Günther, t. c. p. 110.

Serranus diacanthus Kner, Novara-Exp. Fische 1865—1867, p. 20.

Serranus sexfasciatus Day, Fishes of Malabar, 1865, p. 2.

Serranus fasciatomaculatus Peters, Monatsber. Akad. Berlin 1865, p. 111.

Epinephelus dayi Bleeker, Verh. Akad. Amsterdam XIV. N⁰. 2, 1874, p. 105.

Epinephelus diacanthus, Bleeker, Ned. Tijdschr. Dierk. IV. 1873, p. 137. — Atl. ichth. VII. 1876, p. 55 (footnote).

? *Serranus salmonides* Kossmann & Räuber, Verh. Naturh. - Med. Vereins Heidelberg I. 1876, p. 11.

Epinephelus fasciato-maculatus Bleeker, Verh. Akad. Amsterdam XVIII. (1877) 1878, p. 6.
Serranus diacanthus Day, Fishes of India 4^0 1878—1888, p. 17.
Epinephelus diacanthus Boulenger, Cat. Brit. Mus. 2nd. ed. I. 1895, p. 209.
Epinephelus diacanthus Jordan & Evermann, Proc. U. S. Nat. Mus. XXV. 1902, p. 341.
Epinephelus diacanthus Jordan & Seale, Bull. Bur. Fish. Wash. XXVI. (1906) 1907, p. 19.
Epinephelus diacanthus Jordan & Richardson, l. c. XXVII. (1907) 1908, p. 256.
Epinephelus diacanthus M. Weber, Siboga-Exp. Fische 1913, p. 202.
Serranus diacanthus Hora, Mem. Asiat. Soc. Bengal VI. 1924, p. 486.
Epinephelus diacanthus Barnard, Ann. S. Afric. Mus. XXI. 1925—1927, p. 478.
Epinephelus diacanthus Fowler, Fish. Oceania, Mem. Bernice P. Bish. Mus. X. 1928, p. 177.

D. XI. 15—17; A. III. 8; P. 1. 16—17; V. I. 5; L.l. 93—95; L. tr. $\begin{array}{c}11-15\\\hline 1\\\hline 36-38\end{array}$.

Height 2.9—3, 3.7—3.8 in length with caudal. Head 2.3—2.4, 2.6—3 in total length. Eye 4.8—5, equal to or somewhat less than snout. Interorbital space 1.5 in head. Lower jaw projecting. Mouth somewhat oblique. Maxillary extending to below posterior border of eye, the width of its distal extremity $^1/_2$ to $^3/_5$ diameter of eye. Teeth in narrow bands. Outer row of fixed teeth and canines rather strong. Praeoperculum finely serrated behind, its border forming a right angle. Two or more strong spines at angle. Middle opercular spine nearer to lower than to upper one, lower much further back than upper; opercular flap pointed. Head covered with cycloid scales, maxillary naked or partly scaly. Gillrakers shorter than gill-fringes, 14—15 on lower part of anterior arch. Dorsal originating above base of pectorals, third and fourth spines longest, $^1/_3$ or $^1/_2$ length of head, shorter than longest soft dorsal rays. Second anal spine stronger than and as long as third, much shorter than soft anal rays. Pectorals as long as postorbital part of head; ventrals shorter. Caudal subtruncate in the adult, rounded in the young. Scales ciliated. Colour of alcohol-specimens brownish, with five or six more or less distinct broad vertical bars on body and tail. Body and fins dark-spotted or not. Length 520 mm.

Habitat: Buru! — From Madagascar, coast of Natal, Red Sea?, coasts of Persian Gulf and of British India, Siam, Tonkin, China, Formosa, Japan and Philippines. In sea.

18. **Epinephelus morrhua** (C.V.).

Serranus morrhua Cuvier & Valenciennes, Hist. Nat. Poissons IX. 1833, p. 434.

Serranus poecilonotus Temminck & Schlegel, Fauna Japonica, Pisces 1844, p. 6.
Serranus poecilonotus Bleeker, Verh. Batav. Gen. XXVI. N^0. 4, 1855, Ichth. Japan, p. 61.
Serranus angularis Günther, Cat. Brit. Mus. I. 1859, p. 126 (nec C. V.).
Serranus radiatus Day, Proc. Zool. Soc. London 1867, p. 699.
Serranus morrhua Klunzinger, Abh. zool. bot. Ges. Wien XX. 1870, p. 678.
Epinephelus morrhua Bleeker, Poissons de Madagascar 1875, p. 89.
Epinephelus poecilonotus Bleeker, Verh. Akad. Amsterdam XVIII. (1877) 1878. Poissons Japon. p. 6.
Serranus morrhua Day, Fishes of India 4^0, 1878—1888, p. 21.
Serranus (*Epinephelus*) *brunneus* Steindachner & Döderlein, Denkschr. Akad. Wien XLVII. 1883, p. 230 (nec Bloch).
Serranus (*Hyposerranus*) *morrhua* Klunzinger, Fische des Rothen Meeres I. 1884, p. 3.
Serranus morrhua Boulenger, Proc. Zool. Soc. London 1889, p. 244.
Epinephelus morrhua Sauvage, Hist. Madagascar, Poissons 1891, p. 65.
Epinephelus morrhua Boulenger, Cat. Brit. Mus. 2nd. ed. i. 1895, p. 208.
Epinephelus morrhua Steindachner, Ann. Hofmuseum Wien XI. 1896, p. 197.
Epinephelus morrhua Jordan & Richardson, Proc. U. S. Nat. Mus. XXXVII. 1910, p. 454.
Epinephelus poecilonotus Franz, Abhandl. K. Bayer. Akad. Wissensch. IV. Suppl. Bd. 1. 1910, p. 35.
Epinephelus poecilonotus Snyder, Proc. U. S. Nat. Mus. XLII. 1912, p. 414.
Epinephelus poecilonotus Jordan, Tanaka & Snyder, Journ. Coll. Sci. Univ. Tokyo XXXIII. Art. 1, 1913, p. 156.
Epinephelus morrhua M. Weber, Siboga-Exp. Fische 1913, p. 202.
Epinephelus morrhua Barnard, Ann. S. Afric. Museum XXI. 1925—1927, p. 476.

D. XI. 14—15; A. III. 8; P. 1.15—16; V. I. 5; L.l. 104; L. tr. $\begin{array}{c}15\\ \hline 1\\ \hline 50\end{array}$.

Height 3—3.3 in total length, head 2.5—2.7 in total length. Eye 5—5.5, more than interorbital space and less than snout. Teeth in narrow bands, outer series of fixed teeth and canines very strong. Lower jaw projecting. Maxillary extending to below posterior half of eye, the width of its distal extremity two thirds of eye. Praeoperculum serrated behind, somewhat produced at its angle, which is provided with a few strong spines. Opercular spines equidistant, the lower much further back than the upper, which is very small. Opercular flap pointed. Head covered with cycloid scales. Maxillary naked (in a large specimen). Gillrakers as long as gill-fringes, 15—16 on lower part of anterior arch. Dorsal originating above base of pectorals; third or fourth spine longest, two fifths or three fifths of head, and about as long as longest soft dorsal rays. Second and third anal spine equal, much shorter than soft anal rays. Pectorals one half of head or shorter. Ventrals much shorter than pectorals, far distant from anus. Caudal truncate in the adult, rounded in the young. Scales ciliated. Colour of a large alcohol-specimen brownish, with four broad bands running obliquely backwards to dorsal; these bands are indistinct, but their borders are very clear and dark brown: the first running from opercular flap to dorsal, the second and third one are bifurcated below, one branch from the second running to opercular flap and meeting there the first band. The fourth band on the caudal peduncle. Two dark stripes from eye to opercular border. Head, upper part of body, dorsal and caudal with brown spots. Ventrals and anal brown. Pectorals yellowish, brown at base. Length 540 mm.

Habitat: Buru! — Coast of Natal, Madagascar, Mauritius, Red Sea, Mouth of Persian Gulf, Muscat, Madras, Japan.

19. **Epinephelus dämeli** (Gthr.).

Serranus Dämelii Günther, Ann. Mag. Nat. Hist. (4) XVII. 1876, p. 391.
Serranus Damelii de Castelnau, Proc. Linn. Soc. N. S. Wales III. 1879, p. 365.
Serranus Damelii Macleay, o. c. VIII. 1883, p. 254.
Epinephelus daemelii Boulenger, Cat. Brit. Mus. 2nd. ed. I. 1895, p. 223.
Epinephelus daemetii (sic) Seale, Occas. Papers Bernice P. Bishop Mus. I. 1901, p. 76.
Epinephelus daemeli Seale, o. c. IV. 1906, p. 36.
Epinephelus daemeli (sic) Jordan & Seale, Bull. Bur. Fish. Wash. XXV. (1905) 1906, p. 259.
Epinephelus damelli (sic) Mc Culloch, Check-list of fish etc. of N. S. Wales Part II. 1919, p. 45. — The Australian Mus. Mag. II. N⁰. 3, 1924, Fig. on p. 106.

D. XI 14; A. III 8; Sc. 110—130 $\frac{15-17}{50}$; l.l. 72—75.

Teeth in narrow bands, in two series on the sides of the mandible; canines strong. Depth of body 3 to $3^{1}/_{2}$ times in total length, length of head $2^{1}/_{2}$ to 3 times. Snout longer than diameter of eye, which is 6 or $6^{1}/_{2}$ times in length of head, and nearly equals interorbital width; nostrils widely remote from each other, posterior much the larger; lower jaw projecting; maxillary reaching beyond vertical of posterior border of eye, the width of its distal extremity $^{2}/_{3}$ to $^{3}/_{4}$ diameter of eye; praeopercular border rounded, the serrae very slightly enlarged at the angle; middle opercular spine a little nearer lower than upper, both terminating on the same vertical line; opercular flap obtusely pointed, its upper border very convex; head nearly entirely covered with cycloid scales; maxillary with a band of small scales. Gill-rakers short and few, 11 or 12 (and a few rudiments) on lower part of anterior arch. Dorsal originating above base of pectoral; third or fourth spine longest, $^{1}/_{3}$ to $^{2}/_{5}$ length of head, nearly as long as longest soft rays. Pectoral $^{3}/_{5}$ length of head. Ventral shorter, not reaching anus. Second anal spine as long as or a little shorter than third, $^{1}/_{4}$ to $^{2}/_{7}$ length of head, $^{3}/_{5}$ to $^{2}/_{3}$ length of longest soft rays. Caudal rounded. Scales ciliated in the young, cycloid in the adult. Purplish black, paler beneath, with or without faint bluish spots and oblique dark crossbars; a black spot on dorsal side of caudal peduncle; soft dorsal, anal, and caudal black at the end, with a fine whitish edge. Total length 630 mm. [After Boulenger, not seen by us].

Habitat: New Guinea. — Solomon islands, Guam, Samoa, Norfolk Island, Lord Howe island, coast of New South Wales.

20. **Epinephelus megachir** (Rich.).

Serranus megachir Richardson, Rep. Ichth. China, Rep. 15th meet. Brit. Assoc. 1846, p. 230.
Serranus gilberti Richardson, ibid. (pro parte).
Serranus pardalis Bleeker, Verh. Bat. Gen. XXII. 1849, Percoiden p. 37.
Serranus gilberti Günther, Cat. Brit. Mus. I. 1859, p. 148 (pro parte).
Serranus quoyanus Günther, l. c. p. 153 (nec C. V.).
Epinephelus pardalis Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 232.
Epinephelus Quoyanus Bleeker, o. c. II. 1865, p. 281.
Serranus hexagonatus Klunzinger, Abh. zool. bot. Ges. Wien XX. 1870, p. 683 (pro parte).
Serranus gilberti Günther, Brenchley's Cruise of the Curaçao 1873, p. 410 (nec Rich.).
Epinephelus gilberti Bleeker, Verh. Akad. Amsterdam XIV. N^{0}. 2, 1874, p. 91 — Atl. ichth. VII. 1873—1876, p. 56 (nec Rich.).
Serranus merra Day, Fishes of India 4^{0}, 1878—1888, p. 13 (nec Bloch).
Serranus gilberti Day, l. c. p. 746 (nec Rich.).
Serranus alatus Macleay, Descr. Cat. Austr. Fish. I. 1881, p. 18.
Epinephelus megachir Boulenger, Cat. Brit. Mus. 2nd. ed. I. 1895, p. 219.
Epinephelus megachir Jordan & Seale, Bull. Bur. Fish. XXVI. (1906) 1907, p. 20.
Epinephelus megachir Jordan & Richardson, o. c. XXVII. (1907) 1908, p. 256. — Proc. U. S. Nat. Mus. XXXVII. 1910, p. 448.
Epinephelus gilberti Bean & Weed, Proc. U. S. Nat. Mus. XLII. 1912, p. 605 (nec Rich.).
Epinephelus megachir Jordan, Tanaka and Snyder, Journ. Coll. Sci. Univ. Tokyo XXXIII. art. 1, 1913, p. 154.
Serranus daemelii Fowler, Fish. Oceania, Mem. Bernice P. Bish. Mus. X. 1928, p. 179.

D. XI. 16—18; A. III. 8; P. 1.16; V. I. 5; L.l. 86—89; L. tr. $\begin{array}{c}10\text{—}12\\ \hline 1\\ \hline 38\text{—}40\end{array}$.

Height 2.9—3.2, 3.7—4 in length with caudal. Head 2.3—2.4, 2.9—3.1 in length with caudal. Eye 5—6, equal to or slightly less than snout, which has a convex profile. Interorbital space somewhat less than eye. Lower jaw projecting. Mouth somewhat oblique, maxillary reaching to below posterior border of eye, its width at distal extremity 1.3—1.7 in diameter of eye. Praeoperculum slightly produced at angle, which is rounded and armed with enlarged serrae. Hindborder of praeoperculum finely serrated. Opercular spines equidistant, lower one somewhat further back than upper one. Opercular flap pointed. Teeth in narrow bands, in two series on the sides of the lower jaw. Canines moderate. Head nearly entirely covered with cycloid scales, maxillary naked. Gillrakers shorter than gill-fringes, 12—13 and some rudiments on lower part of anterior arch. Dorsal originating above base of pectorals, fourth spine longest, 2—2.7 in head, somewhat shorter than longest soft dorsal rays. Second and third anal spine subequal, shorter than second dorsal spine and much shorter than longest soft anal rays. Pectorals longer than head without snout, ventrals equal to postorbital part of head. Scales ciliated, those on first part of body above lateral line almost smooth. Caudal rounded. Brown, with large dark spots of unequal size, much larger than interspaces, which form a broad network. Similar spots on vertical fins, pectorals and ventrals brown. Length 350 mm.

Nom. indig.: Kerapo-matjan (Malay. Batavia).

Habitat: Singapore; Sumatra (Benkulen, Kauer, Padang, Ulakan, Priaman); Nias; Banka; Biliton; Duizend-islands; Java (Batavia, Bantam, Tanara, Patjitan); Enkhuizen island; Celebes (Makassar!, Bulucomba, Badjoa, Menado); Saleyer!; Sumbawa; Flores; Timor; Buru; Ternate; Ceram; Ambon; Banda; Misool; Waigeu; South coast of New Guinea. — Coasts of British India, Siam, Philippines, China, Japan, Queensland, Western Australia, Louisiade Archipelago. In sea.

21. **Epinephelus sexfasciatus** (C. V.).

Serranus sexfasciatus Cuvier & Valenciennes, Hist. Nat. Poissons II. 1828, p. 360.
Serranus sexfasciatus Bleeker, Verh. Bat. Gen. XXII. 1849, Percoiden p. 38.
Serranus diacanthus Günther, Cat. Brit. Mus. I. 1859, p. 110 (pro parte).
Epinephelus sexfasciatus Bleeker, Verh. Akad. Amsterdam XIV. N⁰. 2, 1874, p. 103 — Atl. ichth. VII. 1873—1876, p. 60.
Serranus sexfasciatus Day, Fishes of India 4⁰, 1878—1888, p. 17.

Serranus diacanthus Steindachner & Döderlein, Denkschr. Akad. Wien XLVII. 1883, p. 231.
Epinephelus sexfasciatus Boulenger, Cat. Brit. Mus. 2nd. ed. I. 1895, p. 214.
Serranus sexfasciatus Fowler, Fish. Oceania, Mem. Bernice P. Bish. Mus. X. 1928, p. 178.

D. XI. 14—15; A. III. 8; P. 16; V. I. 5; L.l. 94; L. tr. $\begin{array}{c}8-9\\\hline 1\\\hline 34\end{array}$.

Height 3.3, 4.1 in length with caudal. Head 2.4, 3 in length with caudal. Eye almost 5, about equal to snout. Interorbital space 1.5 in eye. Lower jaw projecting. Mouth somewhat oblique, maxillary nearly or quite reaching to below posterior border of eye, its width at distal extremity about twice in eye. Praeoperculum serrated behind, its angle produced and provided with two strong diverging spines. Upper opercular spine indistinct. Opercular flap pointed. Teeth rather small, in narrow bands, canines moderate. Gillrakers short, 13 and some rudiments on lower part of anterior arch. Dorsal originating slightly before base of pectorals, third and fourth spine longest, 2.5 in head and almost as long as soft dorsal rays. Last dorsal spine considerably shorter than longest spine. second anal spine stronger than but as long as third one, much shorter than soft anal rays. Pectorals as long as postorbital part of head, ventrals somewhat shorter. Caudal rounded. Scales ciliated. Colour of alcohol-specimen reddish brown above, lighter below with six broad crossbands, the first at nape and the last through caudal peduncle, continued on base of dorsal and on anal. Indistinct light spots on body. Vertical fins and specially their soft parts covered with rows of dark spots, which also form a dark margin on these fins. Ventrals darkish in their distal part, pectorals light yellowish. Length 275 mm.

Nom. indig.: Kerapo-bebeh (Malay.); Balang (Sundan.).

Habitat: Singapore; Sumatra (Siboga, Padang, Benkulen); Java (Batavia); Borneo (Sandakan); Celebes (Makassar); Saleyer!; Moluccos!; Arafura sea. — Maldives, China, Japan, Philippines, Louisade Archipelago. In sea.

22. **Epinephelus maculatus** (Bl.).

Holocentrus maculatus Bloch, Ausländ. Fische IV. 1790, p. 96.
Holocentrus albofuscus Lacépède, Hist. Nat. Poissons IV. 1802, p. 384.
Serranus quoyanus Cuvier & Valenciennes, Hist. Nat. Poissons VI. 1830, p. 519.

Serranus gaimardi Cuvier & Valenciennes, t. c. p. 520.
Serranus gaimardi Quoy & Gaimard, Voyage Astrolabe, Poissons 1833, pl. III. fig. 3.
Serranus Quoyanus Bleeker, Verh. Bat. Gen. XXII. 1849, Percoïden p. 4.
Serranus Gaimardi Bleeker, ibid.
Serranus Sebae Bleeker, Nat. Tijdschr. Ned. Indië VI. 1854, p. 488.
Serranus maculatus Bleeker, o. c. XI. 1856, p. 398.
Serranus sebae Günther, Cat. Brit. Mus. I. 1859, p. 137 (pro parte).
Epinephelus Sebae Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 232.
Serranus longispinis Kner, Sitzber. Akad. Wien XLIX, 1864, p. 483. — Novara-Exp. Fische 1865—67, p. 27.
Epinephelus albofuscus Bleeker, Ned. Tijdschr. Dierk. II. 1865, p. 146.
Serranus longispinis Playfair & Günther, Fishes of Zanzibar, 1866, p. 10 (pro parte).
Epinephelus maculatus Bleeker, Verh. Akad. Amsterdam XIV. N^0. 2, 1874, p. 75. — Atl. ichth. VII. 1873—1876, p. 50.
Serranus medurensis Günther, Fische der Südsee 1873—1875, p. 8.
Serranus maculatus Day, Fishes of India 4^0, 1878—1888, p. 14.
Epinephelus maculatus Boulenger, Cat. Brit. Mus. 2nd. ed. I. 1895, p. 211.
Cephalopholis maculatus Seale & Bean, Proc. U. S. Nat. Mus. 1908, p. 235.
Epinephelus maculatus Barnard, Ann. S. Afric. Mus. XXI. 1925—1927, p. 478.
Serranus maculatus Fowler, Fish. Oceania, Mem. Bernice P. Bishop Mus. X. 1928, p. 177.

D. XI. 16; A. III. 8; P. 1.17; V. I.5; L.l. ±100; L. tr. $\begin{array}{c}12\\ \hline 1\\ \hline 40\end{array}$.

Height 2.6—3.1, 3.4—3.9 in length with caudal. Head 2.3—2.4, 2.8—3.1 in length with caudal. Eye 3.8 (in young specimen) — 5.1, equal to or slightly more than snout. Interorbital space three fifths of diameter of eye. Maxillary scaly, reaching beyond hindborder of eye, its width at distal extremity 1.6 in eye. Praeopercular border obtusely angulate, a little produced at angle, which is armed with enlarged serrae. Opercular flap pointed; middle opercular spine nearer lower than upper; lower further back than upper. Gillrakers about 12 and some rudiments on lower part of anterior arch. Third and fourth dorsal spine longest, 2.4—2.7 in length of head, longer than longest soft rays. Last dorsal spine two thirds or three fourths of longest spine. Second and third anal spines subequal, scarcely shorter than last dorsal spine. Longest soft anal rays equal to longest dorsal spines. Pectorals equal to postorbital part of head, ventrals as long as distance between hindborder of eye and base of middle opercular spine. Caudal rounded. Scales mostly ciliated, those of head cycloid. Colour of very young specimens dark brown, with large white blotches on head and body, one in front of dorsal and one through posterior part of spinous dorsal and continued on back, forming more or less well defined crossbars. In older specimens up to 100 mm. those white blotches are still visible, and head and body and fins are covered with distant black spots. In the adult all traces of the white blotches have disappeared and the fish is brownish, covered with black distant spots on head, body and tail and all fins. Length 400 mm. [Specimens of BLEEKER's collection in the Leiden Museum seen by us].

Nom. indig.: Kerapo tutol (Malay.).

Habitat: Sumatra (Padang); Java (Batavia, Karangbollong); Celebes (Macassar, Menado, Gorontalo); Ternate; Batjan; Buru; Amboina; Timor; New Guinea (Doreh). — Coasts of Natal and Zululand, Zanzibar, Mauritius, Seychelles, coasts of British India, Ceylon, China, Philippines, Caroline-islands, Solomon-islands, Samoa, Fiji-islands, eastwards to Paumotu islands. In sea.

23. **Epinephelus rhyncholepis** (Blkr.).

Serranus rhyncholepis Bleeker, Nat. Tijdschr. Ned. Indië III. 1852, p. 749.
Epinephelus rhyncholepis Bleeker, Verh. Akad. Amsterdam XIV. N⁰. 2, 1874, p. 107. — Atl. ichth. VII. 1873—1876, p. 62.
Serranus rhyncholepis Lunel, Mém. Soc. Phys. Hist. Nat. Genève. 1881, p. 270.
Epinephelus rhyncholepis Boulenger, Cat. Brit. Mus. 2nd. ed. I. 1895, p. 231.
Serranus rhyncholepis Fowler, Fish. Oceania, Mem. Bernice P. Bishop Mus. X. 1928, p. 181.

D. XI. 17; A. III. 7—8; P. 1.16; V. I. 5; L.l. ± 88; L. tr. $\begin{array}{c}11-12\\\hline 1\\\hline 45\end{array}$.

Height 3—3.2, 3.8 in length with caudal. Head 2.3—2.5, 2.9 in length with caudal. Eye 4.3—4.5, a little more than snout. Interorbital space 1.7—2.6 in eye. Maxillary naked, reaching to below posterior border of eye or far beyond, the width of its distal extremity 1.7 in eye. Canines moderate, teeth in two series on sides of mandibles. Praeoperculum rounded, its angle produced, serrae rather strong. Opercular flap pointed. Opercular spines equidistant, lower further back than upper. Gillrakers 10 and some rudiments on lower part of anterior arch. Fourth dorsal spine longest, $^2/_5$ length of head. Last dorsal spine $^3/_5$ or almost $^3/_4$ of longest spine. Longest soft rays of dorsal somewhat shorter; longest soft rays of anal somewhat longer than longest dorsal spine. Second and third anal spines subequal, scarcely shorter than last dorsal spine. Pectorals equal to postorbital part of head, ventrals equal to distance between eye and middle opercular spine. Caudal rounded. Scales of head cycloid, those of body and tail ctenoid. Colour of alcohol specimens reddish brown, each scale of body and tail with a white spot. Fins brownish. [Description made after the two typical specimens of BLEEKER's collection in the Leiden Museum, long 306 and 166 mm].

Habitat: Celebes (Makassar, Bulucomba!); Timor (Atapupu). — Madagascar, Mauritius, Okinawa, Lord Howe island, Norfolk island. In sea.

24. **Epinephelus dictiophorus** (Blkr.).

Serranus dictiophorus Bleeker, Acta Soc. Sci. Indo-Neerl. I. N⁰. 6, 1856, p. 38.
Serranus gaimardi Playfair, Proc. Zool. Soc. London 1867, p. 847.
Epinephelus dictiophorus Bleeker, Verh. Akad. Amsterdam XIV. N⁰. 2, 1874, p. 115. — Atl. ichth. VII. 1873—1876, p. 65.
Epinephelus dictiophorus Boulenger, Cat. Brit. Mus. 2nd ed. I. 1895, p. 216.
Serranus dictiophorus Fowler, Fish. of Oceania, Mem. Bern. P. Bish. Mus. X. 1928, p. 178.

D. XI. 17; A. III. 8; P. 1.16; V. I. 5; L.l. 109; L. tr. $\begin{array}{c}11\\ \hline 1\\ \hline 38\end{array}$.

Height 3.1, 3.7 in length with caudal. Head 2.5, 3 in length with caudal. Eye 5.9, 1.4 in snout. Interorbital space three fourths of eye. Maxillary scaly, reaching to below hinder half of eye, the width of its distal extremity 1.1 in eye. Praeopercular border obtusely angular, serrae at the angle enlarged. Opercular spines equidistant, the lower not farther back than the upper. Opercular flap pointed. Gillrakers 12 and some rudiments on lower part of anterior arch. Third and fourth dorsal spines longest, 2.6 in head, as long as longest soft dorsal rays. Last dorsal spine two thirds of longest ones. Second and third anal spine subequal, slightly shorter than last dorsal spine. Longest soft anal rays as long as those of dorsal. Pectorals equal to postorbital part of head, ventrals slightly shorter. Caudal slightly rounded. Colour of alcohol specimen brownish, with rather large distant black spots on all fins excepting the spinous dorsal. Head, body and tail covered with a greyish network. In the specimen described, the type of BLEEKER in the Leiden Museum, long 336 mm., there are only traces left of this network on the breast and chin. Length 350 mm.

Habitat: Celebes (Menado!). — Seychelles, Hawaii.

25. **Epinephelus bontoides** (Blkr.).

Serranus bontoides Bleeker, Nat. Tijdschr. Ned. Indië VIII. 1855, p. 405.
Epinephelus bontoides Bleeker, Ned. Tijdschr. Dierk. II. 1865, p. 281. — Verh. Akad. Amsterdam XIV. N⁰. 2, 1874, p. 85. — Atl. ichth. VII. 1873—1876, p. 53.
Epinephelus bontoides Boulenger, Cat. Brit. Mus. 2nd. ed. I. 1895, p. 218.
Serranus bontoides Fowler, Fish. of Oceania, Mem. Bern. P. Bish. Mus. X. 1928, p. 178.

D. XI. 16—17; A. III. 8; P. 1.16—17; V. I. 5; Ll. 91; L. tr. $\begin{array}{c}11-12\\ \hline 1\\ \hline 38\end{array}$.

Height 2.8, 3.4 in length with caudal. Head 2.6, 3.2 in length with caudal. Eye 4.5, about equal to snout. Interorbital space about 1.5 in eye. Mouth somewhat oblique. Lower jaw projecting. Maxillary reaching to below posterior border of eye, its width at distal extremity about one half of diameter of eye. Teeth in narrow bands, the outer row of fixed teeth and the canines small. Praeoperculum obtusely angular, its hindborder serrated, the serrae near angle enlarged. Opercular spines nearly equidistant, the lower not much farther back than the upper. Opercular flap pointed. Head covered with cycloid scales. Maxillary naked. Gillrakers 10 1) and some rudiments on lower part of anterior arch, much shorter than gill-fringes. Dorsal originating above base of pectorals; fourth spine longest, 2.5 in head and somewhat shorter than longest soft dorsal rays. Last dorsal spine 3.5 in head. Second anal spine somewhat longer than third, shorter than soft anal rays. Pectorals as long as postorbital part of head, ventrals shorter. Caudal rounded. Scales ciliated. Brown, lighter below, head, body, vertical fins, base of pectorals and ventrals with distant dark spots, a few round white spots on chin and on back may be present. Soft dorsal, anal, pectorals and caudal with a narrow ligth border. Length 230 mm.

Habitat: Bali; Celebes (Makassar!, Menado, Tombariri); Ambon; New Guinea (Doreh, Kaimana!). — Carolines. In sea.

26. **Epinephelus awoara** (Temm. & Schl.).

Serranus awoara Temminck & Schlegel, Fauna Japonica, Pisces, 1844, p. 9.
Serranus awoara Richardson, Rep. 15th meeting Brit. Ass. China, Japan (1845) 1846, p. 231.

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1) 14—16 according to Boulenger.

Serranus awoara Günther, Cat. Brit. Mus. I. 1859, p. 150.

Serranus awoara Kner, Novara Exp. Fische, 1865—1867, p. 26.

Epinephelus awoara Bleeker, Ned. Tijdschr. Dierk. IV. 1873, p. 137. — Atl. ichth. VII. 1873—1876, p. 59.

Serranus awoara Steindachner & Döderlein, Denkschr. Akad. Wien XLVII. 1883, p. 231.

Serranus awoara Nyström, Bihang till k. Sv. Vet. Akad. Handl. XIII. Afd. IV. N⁰. 4, 1887, p. 6.

Epinephelus awoara Boulenger, Cat. Brit. Mus. 2nd. ed. I. 1895, p. 230.

Epinephelus awoara Jordan & Richardson, Proc. U. S. Nat. Mus. XXXVII, 1910, p. 457.

Epinephelus awoara Franz, Abhandl. Bayer. Akad. Wiss. IV. Suppl. Bd. — 1. Abh. 1910, p. 36.

Epinephelus awoara Jordan, Tanaka & Snyder, Journ. Coll. Science Univ. Tokyo, XXXIII. art. 1, 1913, p. 156.

D. XI. 15 (16); A. III. 8; P. 1.16; V. I. 5; Ll. ± 106; L. tr. $\begin{array}{c}12\\ \hline 1\\ \hline 40\end{array}$.

Height 2.9, 3.6 in length with caudal. Head 2.3, 2.9 in length with caudal. Eye 5.6, 1.5 in snout. Interorbital space 1.3 in eye. Maxillary naked, reaching to below hindborder of eye. Praeopercular border forming an almost right angle, serrated, the serrae at angle enlarged. Opercular spines equidistant, lower farther back than upper. Opercular flap pointed. Gillrakers moderate, about twelve on lower part of anterior arch. Fourth dorsal spine longest, slightly less than longest soft dorsal rays and 2.5 in head. Last dorsal spine three fourths of longest spine. Second anal spine slightly shorter than third, which is about as long as last dorsal spine. Longest soft anal rays slightly longer than soft dorsal ones. Pectorals equal to postorbital part of head, ventrals almost as long. Caudal rounded. Colour of alcohol-specimen brown, with 5 dark crossbands, the first and second below spinous dorsal, the third and fourth below soft dorsal, the fifth on the caudal peduncle. Moreover some scattered dark spots on body and on spinous dorsal and pectorals. Anal with traces of a white longitudinal band. [Description made after one of the typical specimens in the Leiden Museum, long 216 mm.]. Length 380 mm.

Habitat: Singapore. — Japan, China, Formosa.

27. **Epinephelus corallicola** (C. V.).

Serranus corallicola Cuvier & Valenciennes, Hist. Nat. Poissons II. 1828, p. 336.

Serranus miliaris Cuvier & Valenciennes, o. c. VI. 1830, p. 520.

Serranus altivelioides Bleeker, Percoiden p. 38, Verh. Bat. Gen. XXII. 1849.
Serranus macrospilos Bleeker, Nat. Tijdschr. Ned. Indië IX. 1855, p. 499.
Epinephelus altivelioides Bleeker, Ned. Tijdschr. Dierk. II. 1865, p. 281.
Serranus altivelioides Kner, Novara Exp. Fische, 1865—67, p. 23.
Epinephelus macrospilus Bleeker, Verh. Akad. Amsterdam XIV. 1874, N^0. 2, p. 81 — Atl. ichth. VII. 1873—1876, p. 52.
Epinephelus corallicola Bleeker, l. c. p. 83. — Atl. ichth. p. 53.
Serranus howlandi Günther, Fische der Südsee, 1873—1875, p. 8.
Serranus corallicola Day, Fishes of India 4^0, 1878—1888, p. 20.
Serranus corallicola Macleay, Descr. Cat. Austr. Fish. I. 1881, p. 16.
Epinephelus corallicola Boulenger, Cat. Brit. Mus. 2nd ed. I. 1895, p. 236.
Epinephelus corallicola Jordan & Seale, Bull. Bur. Fish. XXV. (1905), 1906, p. 259.
Epinephelus corallicola Seale, Occas. Papers Bern. P. Bish. Mus. 1906, p. 35.
Serranus corallicola Fowler, Fish. of Oceania, Mem. Bern. P. Bish. Mus. X 1928, p. 181.

D. XI. 15—16 (17); A. III. 8; P. 1.16—18; V. I. 5; Ll. 80—110; L. tr. $\begin{array}{c}14\\\hline 1\\\hline 43\end{array}$.

Height 3, 3.7—3.8 in length with caudal. Head 2.3—2.4, 2.9—3 in length with caudal. Eye about 6, equal to or somewhat more than interorbital space and somewhat less than snout. Mouth somewhat oblique, maxillary extending to below posterior border of eye, the width of its distal extremity 1.3–1.4 in eye. Teeth in rather broad bands, at least in three series on the sides of the lower jaw. Outer row of fixed teeth small, canines moderate or strong. Gillrakers short, 8 to 9 and some rudiments on lower part of anterior arch. Praeoperculum finely serrated behind, its angle obtusely rounded, with a few broad and very blunt spines. Opercular spines nearly equidistant, the lower not farther back than the upper. Opercular flap pointed. Head nearly entirely covered with cycloid scales. Dorsal originating above base of pectorals, fourth and fifth spine equal, almost as long as longest soft dorsal rays and three times in head, considerably longer than last dorsal spine. Second anal spine stronger and somewhat longer than third, much shorter than longest soft anal rays and about equal to second or to third dorsal spine. Pectorals equal to postorbital part of head, ventrals three fourths of eye-diameter shorter. Caudal rounded. Scales cycloid above lateral line and partly below it, ctenoid in small specimens. Colour of alcohol specimens pale brown, head, body and fins covered with dark spots, smaller and more numerous the older the specimen; two or three more or less distinct large dark brown blotches on the dorsal line at the base of the fin, and another behind the latter on the caudal peduncle, sometimes continued downwards as very faint dark crossbands. All the fins with a whitish edge. Length 435 mm.

Nom. indig.: Kerapo beloso (Malay.).

Habitat: Singapore, Java (Batavia, Karangbollong, Prigi); Lombok!; Biliton; Celebes (Makassar, Menado); Batjan; Ambon!; Samau!; Solor; New Guinea. — Madras, Pelew islands, North Australia, Samoa, Mortlock islands, Caroline islands, Greenwich islands, Howland island, Raiatea, Shortland island, Makatea, Rarotonga, Faté. In sea, entering fresh water.

28. **Epinephelus summana** (Forsk.).

Perca summana Forskål, Descript. Animalium 1775, p. 42.
Holocentrus ongus Bloch, Ausländ. Fische IV. 1790, p. 69.
Bodianus summana Bloch, Schneider, Systema Ichthyol. 1801, p. 334.
Pomacentrus summana Lacépède, Hist. Nat. Poissons IV. 1802, p. 511.
Serranus reticulatus Cuvier & Valenciennes, Hist. Nat. Poissons II. 1828, p. 323.
Serranus summana Cuvier & Valenciennes, l. c. p. 344.
Serranus tumilabris Cuvier & Valenciennes, l. c. p. 346.
Serranus summana Rüppell, Atlas Fische Rothen Meeres 1828, p. 104 (pro parte).
Serranus summana Lefebure, Voy. Abyss. Zool. 1845, p. 329.
Serranus bataviensis Bleeker, Verh. Bat. Gen. XXII. 1849, Percoiden, p. 38.
Serranus tumilàbrus Bleeker, l. c. p. 39.
Serranus polystigma Bleeker, Nat. Tijdschr. Ned. Indië IV. 1853, p. 244.
Serranus alboguttatus Günther, Cat. Brit. Mus. I. 1859, p. 129 (nec C. V.).
Serranus summana Günther, o. c. p. 137.
Serranus tumilabris Günther, o. c. p. 138.
Serranus reticularis Günther, o.c. p. 150.
Epinephelus alboguttatus Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 155 (nec C.V).
Epinephelus bataviensis Bleeker, o. c. II. 1865, p. 281.
Epinephelus polystigma Bleeker, ibid.
Serranus ongus Peters, Monatsber. Akad. Berlin 1865, p. 102.
Serranus summana Günther in Playfair & Günther, Fishes of Zanzibar, 1866, p. 8.
Serranus tumilabris Günther in Playfair & Günther, ibid.
Serranus summana Kner, Sitzber. Akad. Wien LVIII, 1868, p. 297.
Epinephelus summana Bleeker, Verh. Akad. Amsterdam XIV. N^0. 2, 1874, p. 105. — Atl. ichth. VII. 1873—1876, p. 61.
Epinephelus ongus Bleeker, l.c. p. 113, l. c. p. 64.
Epinephelus caeruleopunctatus Bleeker, Atl. ichth. VII. 1873—1876, p. 62.
Epinephelus tumilabris Bleeker, in Pollen & van Dam, Poissons de Madagascar, 1875, p. 89.
Serranus summana Day, Fishes of India 4^0, 1878—1888, p. 21.
Epinephelus summana Sauvage, Poissons de Madagascar, 1891, p. 63.
Epinephelus summana Boulenger, Cat. Brit. Mus. 2nd. ed. I. 1895, p. 248.

Epinephelus summana Fowler & Bean, Proc. U. S. Nat. Mus. LXII. 1922, art. 2, p. 27.
Epinephelus summana Whitley, Rec. Austr. Mus. XVI. 1927, p. 13.
Serranus summana Fowler, Fish. of Oceania, Bern. P. Bishop Mus. Mem. X. 1928, p. 183.

D. XI. 14—15; A. III. 8; P. I. 14—15; V. 1.5; Ll. 97—98; L. tr. $\frac{12\text{—}14}{\frac{1}{40\text{—}42}}$.

Height 2.8—3, 3.4—3.6 in length with caudal. Head 2.2—2.5, 2.7—3 in length with caudal. Eye 4.5—5, as long as or a little shorter than snout. Interorbital space one half or three fourths of diameter of eye. Mouth oblique, maxillary reaching to below posterior half of eye, its width at its distal extremity 1.8—1.9 in diameter of eye. Praeoperculum rounded, rather coarsely serrated, the serrae at angle not enlarged. Middle opercular spine nearer to lower than to upper, lower not farther back than upper; opercular flap obtuse, its upper border very convex. Teeth in rather broad bands, in two series on the sides of the mandibles, depressible teeth long, especially those near symphysis of upper jaw. Canines strong but short. Gillrakers rather short, 9 and 2 or 3 rudiments on lower part of anterior arch. Dorsal originating above base of pectorals. Third or third and fourth spine longest, as long as longest soft dorsal rays and one third of head. Last dorsal spine two thirds or three fourths of longest spine. Second anal spine much stronger and somewhat longer than third, almost as long as soft anal rays and as longest dorsal spine. Pectorals nearly as long as head without snout, ventrals slightly less than postorbital part of head, Caudal rounded. Scales mostly ciliated, those of head cycloïd; maxillaries naked. Colour of alcohol-specimens brown, with numerous white dots. The brown colour may be deeper in some parts and cause irregular crossbars or a series of blotches at the base of the dorsal. The white spots are often partly confluent, forming wavy white lines, specially on the sides of the body. Fins generally with a broad submarginal black band and a marginal very narrow white one and covered with white spots as the body. Maxillary groove edged with black. Length 340 mm.

Nom. indig.: Kerapo-bebeh, Kakap-bebeh (Malay.); Entai (Simalur, Tapah).

Habitat: Sumatra (Benkulen, Ulakan, Siboga); Simalur!;

Duizend islands; Java (Batavia, Bantam); Borneo; Celebes (Makassar, Menado, Amurang); Buton; Saleyer!; Solor; Samau!; Flores!; Buru; Ceram; Ambon; Haruko; Ternate; Halmahera; Waigeu; New Guinea (Doreh). — Madagascar, Seychelles, Zanzibar, Red Sea, Aden, coast of British India, Andamans, Okinawa, Carolines, Guam, Philippines, Queensland, eastwards to Society Islands. In sea.

29. **Epinephelus amblycephalus** (Blkr.).

Serranus amblycephalus Bleeker, Act. Soc. Scient. Indo-Neerl. II. 1857, N⁰. 7, p. 32.
Epinephelus amblycephalus Bleeker, Ned. Tijdschr. Dierk. II. 1865, p. 281. — Atl. ichth. VII. 1873—1876, p. 46.
Epinephelus amblycephalus Boulenger, Cat. Brit. Mus. 2nd. ed. 1895, p. 215.

D. XI. 17; A. III. 8; P. 1.17; V. I. 5; L.l. about 105; L. tr. $\frac{16}{\frac{1}{48}}$.

Height 2.7, 3.4 in length with caudal. Head 2.1, 2.6 in length with caudal. Eye 5.4, less than snout. Interorbital space three fourths of eye-diameter. Lower jaw projecting. Maxillary scaly, extending to below posterior border of eye. Canines moderate, teeth in two rows on sides of mandibles. Gillrakers 10 and some rudiments on lower branch of anterior arch. Middle opercular spine much nearer to lower than to upper one, which is small and situated somewhat more forwards than the others. Praeoperculum rectangular, serrae strong, enlarged at angle. Dorsal originating above base of pectorals, the third spine the longest, three times in length of head. Last dorsal spine three fourths of third; longest soft rays longer than third spine. Second and third anal spines subequal, as long as last dorsal spine. Longest soft anal rays as long as those of dorsal. Pectorals slightly less than postorbital part of head, ventrals scarcely shorter. Caudal rounded. Colour of alcohol specimens light yellowish brown, with seven dark brown crossbands, edged in front and behind by a series of small round black spots; the first on head, through interorbital space and extending as two not very distinct branches on the cheeks; the second across nape ending about at the level of the upper opercular spine. The third and fourth extending on spinous dorsal, the third moreover through base of pectorals the fifth through soft dorsal to anal spines, the sixth through soft dorsal and soft anal, the seventh on caudal peduncle. Base of caudal dark. Length 304 mm. [The description is made after the only specimen known, the type-specimen seen by us in the Leiden Museum].

Habitat: Ambon (!). In sea.

30. **Epinephelus nebulosus** (C. V.).

Serranus nebulosus Cuvier & Valenciennes, Hist. Nat. Poissons II. 1828, p. 313.

Serranus moara Temminck & Schlegel, Fauna Japonica, Pisces 1844, p. 10.

Serranus nebulosus Bleeker, Nat. & Geneesk. Arch. Ned. Indië (3) II. 1845, p. 525. — Verh. Bat. Gen. XXII. 1849, Perc. p. 34.

Serranus moara Bleeker, Verh. Bat. Gen. XXV. 1853, Ichth. Japan, p. 24.

Serranus moara Kner, Novara Exp. I. Fische, 1865—1867, p. 23.

Epinephelus nebulosus Bleeker, Verh. Akad. Amsterdam XIV. 1874, N⁰. 2, p. 117. — Atl. ichth. VII. 1873—1876, p. 66.

Epinephelus nebulosus Boulenger, Cat. Brit. Mus. 2nd ed. 1895, p. 240.

Epinephelus moara Jordan & Seale, Proc. Davenport Acad. Sci. X. (1905) 1907, p. 9.

Epinephelus nebulosus Jordan & Richardson, Bull. Bur. Fisheries Wash. 1908, p. 256.

Epinephelus moara Jordan & Richardson, Proc. U. S. Nat. Mus. Wash. XXXVII. 1910, p. 456.

Epinephelus nebulosus Franz, Abhandl. K. Bayer. Akad. Wissensch. IV. Suppl. Bd. 1910, p. 35.

Serranus nebulosus Fowler, Fish. of Oceania, Mem. Bern. P. Bish. Mus. X. 1928, p. 181.

D. XI. 16—17; A. III. 8; P. 1.16—17; V. I. 5; L.l. 93—105; L. tr. $\begin{array}{c}13-14\\ \hline 1\\ \hline 38\end{array}$.

Height 2.7, 3.4 in length with caudal. Head 2.3, 2.8 in length with caudal. Eye 5.4, slightly less than snout. Interorbital space 1.7 in diameter of eye. Maxillary with a few scales, reaching to below hinderhalf of eye, its width at distal extremity 1.4 in diameter of eye. Praeoperculum angularly rounded, evenly serrated. Opercular spines equidistant, the lower not much farther behind than the upper. Opercular flap pointed. Gillrakers 12 on lower part of anterior arch, much shorter than branchial filaments. Third, fourth and fifth dorsal spines longest, 3.1 in head, not much longer than last dorsal spine and shorter than longest soft rays. Second anal spine longer than third, longer than longest dorsal spines. Longest soft anal rays as long as those of dorsal. Pectorals equal to postorbital part of head, ventrals one eye-diameter shorter. Caudal rounded. Scales of head cycloid, those of body and tail ctenoid. Colour of alcohol specimens light brown;

head, body and vertical fins marbled with darker. Length 360 mm. [Specimens of BLEEKER's collection in the Leiden Museum seen by us].

Nom indig.: Kerapo (Malay.), Balong (Sundanese), Ukon (Javanese).

Habitat: Sumatra (Telokbetong, Benkulen, Padang); Singapore; Banka; Java (Batavia, Patjitan, Japara, Bantam, Tjilatjap). — Philippines, Formosa, China, Japan and Pelew Islands. — In sea.

31. **Epinephelus fasciatus** (Forsk.).

Perca fasciata Forskål, Descr. Anim. 1775, p. 40.
Epinephelus marginalis Bloch, Ausländ. Fische VII. 1793, p. 14.
Holocentrus erythraeus Bloch, Schneider, Syst. Ichth. 1801, p. 320.
Holocentrus forskael Lacépède, Hist. Nat. Poissons IV. 1802, p. 277.
Holocentrus marginatus Lacépède, l. c. p. 384.
Holocentrus rosmarus Lacépède, l. c. p. 389.
Holocentrus oceanicus Lacépède, l. c. pl. VII. fig. 3.
Serranus marginalis Cuvier & Valenciennes, Hist. Nat. Poissons II. 1828, p. 301.
Serranus oceanicus Cuvier & Valenciennes, l. c. p. 302.
Serranus erythrurus Cuvier & Valenciennes, l. c. p. 320 (fide Sauvage).
Serranus variolosus Cuvier & Valenciennes, l. c. p. 354.
Serranus tsirimenara Temminck & Schlegel, Fauna Japonica, Pisces 1844, p. 7.
Serranus marginalis Richardson, Rep. Ichth. China 15th Report British Assoc. 1846, p. 233.
Serranus marginalis Bleeker, Verh. Bat. Gen. XXII. 1849, Perc. p. 34.
Serranus oceanicus Peters, Monatsber. Akad. Berlin, 1855, p. 428.
Serranus marginalis Günther, Cat. Brit. Mus. I. 1859, p. 135.
Serranus variolosus Günther, l. c. p. 139 (sine syn.).
Serranus marginalis Peters, Monatsber. Akad. Berlin 1865, p. 109.
Serranus marginalis Kner, Novara-Exp. Fische 1865—1867, p. 24.
Epinephelus Retouti Bleeker, Versl. Akad. Amsterdam (2) II. (1866) 1868, p. 339. — Pollen & van Dam, Fauna Madagascar, Poissons 1875, p. 21.
Serranus fasciatus Klunzinger, Abh. zool. bot. Ges. Wien XX. 1870, p. 681.
Serranus fasciatus Günther, Fische der Südsee, 1873—1875, p. 6.
Epinephelus fasciatus Bleeker, Verh. Akad. Amsterdam XIV. 1874, p. 119. — Atl. ichth. VII. 1873—1876, p. 66.
Epinephelus tsirimenara Bleeker, in Pollen & van Dam, Fauna Madagascar, Poissons 1875, p. 89.
Serranus fasciatus Day, Fishes of India 4^0, 1878—1888, p. 15.
Serranus erythrurus Day, l. c. p. 18.
Serranus marginalis Macleay, Descr. Cat. Austr. Fish. I. 1881, p. 16.
Epinephelus fasciatus Macleay, l. c. p. 17.
Serranus cruentatus De Vis, Proc. Linn. Soc. N. S. Wales VIII. 1883, p. 446.
Serranus tsirimenara Steindachner & Döderlein, Denkschr. Akad. Wien XLVII. 1883, p. 232.
Serranus fasciatus Klunzinger, Fische des Rothen Meeres 1884, p. 6.

Serranus erythrurus A. B. Meyer, Ann. Soc. Espãn. Hist. Nat. Madrid XIV. 1885, p. 7.
Epinephelus retouti Sauvage, Poissons de Madagascar, 1891, p. 69.
Epinephelus fasciatus Sauvage, l. c. p. 78.
Epinephelus fasciatus Boulenger, Cat. Brit. Mus. 2nd. ed. I. 1895, p. 238.
Epinephelus fasciatus Waite, Rec. Austr. Mus. V. 1904, p. 166.
Epinephelus fasciatus Seale, Occas. Papers Bern. P. Bish. Mus. IV. 1906, p. 36.
Epinephelus zapyrus Seale, ibid.
Epinephelus tsirimenara Jordan & Richardson, Proc. U. S. Nat. Mus. XXXVII. 1910, p. 460.
Epinephelus tsirimenara Snyder, Proc. U. S. Nat. Mus. XLII. 1912, p. 498.
Epinephelus fasciatus M. Weber, Siboga-Exp. Fische 1913, p. 204.
Epinephelus tsirimenara Jordan, Tanaka & Snyder, Journ. Coll. Sci. Univ. Tokyo XXXIII. Art. I, 1913, p. 157.
Epinephelus fasciatus Jordan & Starks, Ann. Carnegie Mus. XI. N⁰. 3—4, 1917, p. 449.
Epinephelus fasciatus Barnard, Ann. S. Afric. Mus. XXI. 1925—1927, p. 483.
Serranus fasciatus Fowler, Fish. of Oceania, Mem. Bern. P. Bish. Mus. X. 1928, p. 176.

D. XI. 16; A. III. 8; P. 1.17; V. I. 5; L.l. 87—98; L. tr. $\begin{array}{c}10\text{—}11\\ \hline 1\\ \hline 38\text{—}40\end{array}$.

Height 2.7—3, 3.3—3.7 in length with caudal. Head 2.3—2.5, 2.9—3 in length with caudal. Eye 4.3—4.6, equal to snout. Interorbital space 1.5—1.9 in eye. Mouth somewhat oblique, maxillary extending to below posterior border of eye or not so far, its width at distal extremity 1.8 in eye. Praeoperculum somewhat produced at angle, its hindborder finely serrated, some large serrae at angle. Opercular spines equidistant, the lower one scarcely farther back than the upper; opercular flap pointed. Gillrakers moderate, 13—16 on lower part of anterior arch, the first 3 or 4 are more or less rudiments. Teeth forming narrow bands, in 2 to 3 rows on the sides of the lower jaw. Dorsal originating above base of pectorals, third or third and fourth spine longest, slightly longer than last dorsal spine and longest soft dorsal rays and 2.8—3 in head. Second anal spine stronger than third, which is equal to it or a little shorter, both spines shorter than longest soft anal rays. Pectorals about equal to postorbital part of head, ventrals three fourths eye-diameter shorter. Caudal subtruncate in young, rounded in adult specimens. Scales of body ciliated, those of head cycloid. Colour of alcohol specimens yellowish brown, in young specimens often with about 6 darker but not very distinct crossbands on body and tail. A brown circle round the eye and often a streak of the same colour above maxillary. Fins yellowish. Membrane between the dorsal spines deep black in its upper part, with a white outer margin. Length 330 mm.

Nom. indig.: Kerapo-merah (Malay. Batavia).

Habitat: Singapore; Sumatra (Padang); Java (Batavia, Patjitan); Celebes (Makassar, Bulucomba, Badjoa, Tanawanko); Saleyer!; Sangir islands; Sulu islands!; Sumbawa; Flores; Timor; Solor; Banda!; Ambon!; Batjan; Ternate; Kofiau!; Island Mysore; New Guinea. — From the coast of Natal, Madagascar, Zanzibar, Seychelles, Red Sea, coasts of British India to the Philippines, China, Japan, Western Australia and eastwards to the Paumotu Archipelago. In sea.

32. **Epinephelus tauvina** (Forsk.) [Fig. 7. p. 62].

Perca tauvina Forskål, Descr. Animalium 1775, p. 39.
Holocentrus malabaricus Bloch, Schneider, Systema Ichth. 1801, p. 319.
Holocentrus tauvina Bloch, Schneider, l. c. p. 321.
Holocentrus salmoides Lacépède, Hist. Nat. Poissons III. 1802, p. 389.
Holocentrus pantherinus Lacépède, ibid.
Bola? coioides Hamilton Buchanan, Fishes Ganges 1822, p. 82.
Serranus maculosus Cuvier & Valenciennes, Hist. Nat. Poissons II. 1828, p. 332.
Serranus bontoo Cuvier & Valenciennes, l. c. p. 334.
Serranus suillus Cuvier & Valenciennes, l. c. p. 335.
Serranus semipunctatus Cuvier & Valenciennes, l. c. p. 341.
Serranus salmonoides Cuvier & Valenciennes, l. c. p. 343.
Serranus crapao Cuvier & Valenciennes, o. c. III. 1829, p. 494.
? *Serranus diacopeformis* Bennett, Life of Raffles, 1830, p. 686.
Serranus crapao Richardson, Ann. Mag. Nat. Hist. IX. 1842, p. 25.
Serranus schipan Richardson, Rep. 15th meeting Brit. Ass. China, Japan (1845) 1846, p. 231.
? *Serranus variegatus* Richardson ibid.
Serranus crapao Bleeker, Verh. Bat. Gen. XXII. 1849, Percoïden p. 37.
Serranus polypodophilus Bleeker, ibid.
Serranus bontoo Cantor, Journ. Asiat. Soc. Bengal XVIII. 1850, p. 993.
Serranus coioides Cantor, ibid.
? *Serranus areolatus* var. *semipunctata* Rüppell, Samml. des Senckenberg. Mus. 1852, p. 3.
Serranus abdominalis Peters, Monatsber. Akad. Berlin 1855, p. 430.
Serranus Janseni Bleeker, Nat. Tijdschr. Ned. Indië XIII. 1857, p. 376.
Serranus diacanthus Günther, Cat. Brit. Mus. I. 1859, p. 110 (pro parte).
Serranus suillus Günther, l. c. p. 127.
Serranus salmonides Günther, l. c. p. 128.
Serranus crapao Günther, l. c. p. 137.
Serranus bontoo Günther, l. c. p. 138.

? *Serranus chabaudi* de Castelnau, Mém. Poissons Afric. Austr. 1861, p. 3.
Epinephelus crapao Bleeker, Ned. Tijdschr. Dierk. II. 1865, p. 281.
Serranus bontoo Day, Fishes Malabar, 1865, p. 3.
Serranus suillus Playfair & Günther, Fishes of Zanzibar, 1866, p. 5.
Serranus salmonoides Klunzinger, Abhandl. zool. bot. Ges. Wien XX. 1870, p. 682.
Serranus tauvina Klunzinger, l. c. p. 683.
? *Epinephelus variegatus* Bleeker, Ned. Tijdschr. Dierk. IV. 1873, p. 138.
Epinephelus pantherinus Bleeker, Verh. Akad. Amsterdam XIV. N^0. 2, 1874, pp. 33, 78. — Atl. ichth. VII. 1873—1876, p. 51.
Epinephelus polypodophilus Bleeker, ll. cc. p. 36, p. 59.
Epinephelus Janseni Bleeker, ll. cc. p. 80, p. 51.
? *Homalogrystes güntheri* Alleyne & Macleay, Proc. Linn. Soc. N. S. Wales I. 1876, p. 269.
Serranus malabaricus Day, Fishes of India 4^0. 1878—1888, p. 19.
Serranus semipunctatus Day, l. c. p. 20.
Serranus salmoides Day, ibid.
Serranus pantherinus Klunzinger, Sitzber. Akad. Wien 1880, p. 334.
Serranus polypodophilus Klunzinger, ibid.
Serranus tauvina Klunzinger l. c. p. 335.
Serranus crapao Macleay, Descr. Cat. Austr. Fish. I. 1881, p. 17.
Serranus pantherinus Macleay, ibid.
Serranus maculosus Macleay, ibid.
Serranus bontoo Macleay, ibid.
Serranus suillus Macleay, ibid.
Epinephelus crapao, Sauvage, Bull. Soc. Philom. (7) V. 1881, p. 104.
Serranus estuarius Macleay, Proc. Linn. Soc. N. S. Wales VIII. 1883, p. 200.
Serranus salmo(no)ides Klunzinger, Fische des Rothen Meeres 1884, p. 5.
Serranus tauvina Klunzinger, l. c. p. 6.
Serranus polypodophilus Macleay, Proc. Linn. Soc. N. S. Wales IX. 1884, p. 4.
Serranus pantherinus Day, Fauna India, Fishes I. 1889, p. 451.
Epinephelus malabaricus Sauvage, Poissons Madagascar, 1891, p. 67.
Epinephelus abdominalis Sauvage, l. c. p. 511.
Epinephelus tauvina Boulenger, Cat. Brit. Mus. 2nd. ed. I. 1895, p. 244.
Epinephelus tauvina Waite, Mem. Austr. Mus. III. 1899, p. 182.
Epinephelus tauvina Jordan & Evermann, Proc. U. S. Nat. Mus. XXV. 1902, p. 341.
? *Epinephelus (Aethaloperca) heniochus* Fowler, Journ. Acad. Nat. Sci. Philad. (2) XII. Prt. 4, 1904, p. 522.
Epinephelus malabaricus Jordan & Seale, Bull. Bureau Fish. XXVI. (1906) 1907, p. 19.
Epinephelus tauvina Jordan & Seale, l. c. p. 20.
Serranus phaeostigmaeus Fowler, Proc. Acad. Nat. Sci. Philad. LIX. 1907, p. 255.
Epinephelus estuarius Ogilby, Ann. Queensl. Mus. N^0. 10, 1911, p. 50.
Epinephelus (? *praeopercularis*) M. Weber, Siboga-Exp. Fische 1913, p. 202 (nec Blgr.).
Epinephelus estuarius Cockerell, Mem. Queensl. Mus. II. 1913, p 55.
Epinephelus tauvina McCulloch, Check-list of fish. etc. of N. S. Wales, Part II. 1919, p. 45.
Serranus salmoides Hora, Mem. Asiat. Soc. Bengal VI. 1924, p. 486.
Epinephelus tauvina Barnard, Ann. S. Afric. Mus. XXI. 1925—1927, p. 484.

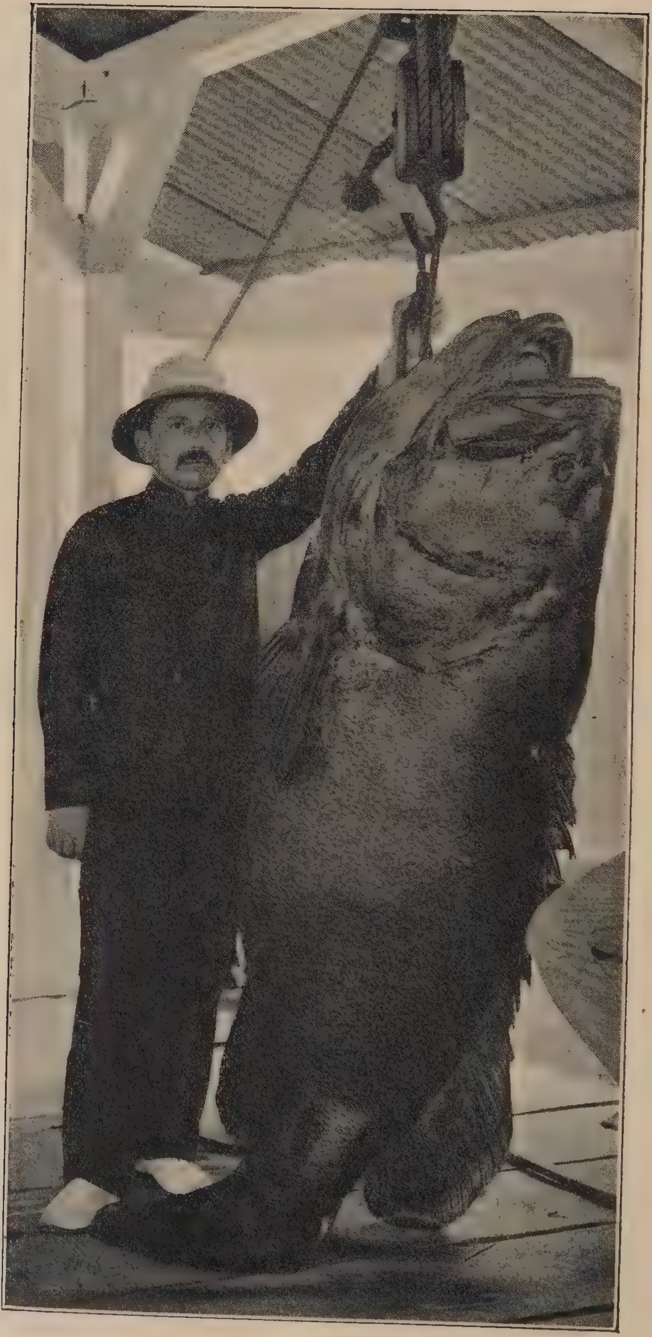

Fig. 7. *Epinephelus tauvina* (Forsk.), over 2 M. long, about 200 Kg. Caught at Singkel, Atjeh, according to Capt. R. Heijtman.

Serranus tauvina Fowler & Bean, Proc. U. S. Nat. Mus. LXXI, 1927, p. 6.
Serranus tauvina Fowler, Fish. of Oceania, Mem. Bern. P. Bish. Mus. X. 1928, p. 182.

D. XI. 15—16; A. III. 8; P. 1.17; V. I. 5; L.l. 97—107; L. tr. $\begin{array}{c} 12-13 \\ \hline 1 \\ \hline 35-39 \end{array}$.

Height 2.9—3.3, 3.4—4.1 in length with caudal. Head 2.3—2.5, 2.7—3 in length with caudal. Eye 5.7—7.8, somewhat less than snout, almost twice in snout in large specimens. Interorbital width less than eye, in large specimens much more than eye. Lower jaw projecting. Mouth somewhat oblique. Maxillary reaching beyond posterior border of eye, the width of its distal extremity equal to eye in large specimens, in smaller specimens 1.5 in eye. Teeth in narrow bands in the young, in broader bands in the adults, in three series on the sides of the mandibles in the latter; canines small, disappearing in old specimens. Praeopercular border angular, sometimes produced at angle, serrated behind, the serrae at angle enlarged. Opercular spines nearly equidistant, lower somewhat further back than upper. Opercular flap pointed, its upper border slightly convex. Gillrakers moderate, 10 to 11 and 4 or 5 rudiments on lower part of anterior arch. Dorsal originating above base of pectorals: third or 4th spine longest, 3.2—3.3 in head, 5 times in large specimens, much shorter than soft rays. Second anal spine as long as or a little shorter than third, much shorter than soft rays. Pectorals a little shorter than postorbital part of head, in large specimens equal to distance between eye and superior end of branchial opening. Ventrals one fourth eye-diameter shorter. Caudal rounded. Scales of head cycloid, those of body and tail ctenoid, cycloid in old specimens. Colour of alcohol-specimens brown, often with indications of darker broad crossbars and with large brown spots on sides of head, body and tail and also on the fins. Sometimes also with chalky white spots on head, body and tail. Old specimens almost uniform dark brown, with indistinct black spots and with lighter markings on pectorals and soft anal. Length 2000 mm.

Nom. indig.: Kerapu-lumpur, kerapo-tutol (Malay. Batavia); Balong (Sundanese); Keratang (Borneo, Balikpapan); Garutung (Atjeh).

Habitat: Singapore; Pinang; Nias!; Sumatra (Atjeh!, Telokbetong, Benkulen, Padang, Priaman); Bintang; Riouw; Banka; Biliton; Java (Batavia, Bantam, Semarang, Surabaja, Pasuruan); Madura; Sumbawa; Borneo (Balikpapan!, Sinkawang, Sungiduri, Sampit); Celebes (Makassar!, Badjoa, North Celebes); Sangir islands; Karakelang!; Timor; Ambon; Batjan; New Guinea (Kaimana!). — Coast of east Africa (Natal!), Madagascar, Red Sea, Persian Gulf, coasts of British India, Andamans, Ceylon, Siam, Tonkin, China, Formosa, Japan, Philippines, Queensland, New South Wales, Louisiades, Palau islands, Thursday island!, Torres Strait, Ponape, Funafuti, Hawaii. In sea, entering rivers.

33. **Epinephelus merra** Bl.

Epinephelus merra Bloch, Ausländ. Fische VII. 1793, p. 17.
Holocentrus hexagonatus Bloch, Schneider, Systema Ichthyol. 1801, p. 323.
Holocentrus merra Lacépède, Hist. Nat. Poissons IV. 1802, p. 384.
Serranus merra Cuvier & Valenciennes, Hist. Nat. Poissons II. 1828, p. 325.
Serranus faveatus Cuvier & Valenciennes, t. c. p. 329.
Serranus hexagonatus Cuvier & Valenciennes, t. c. p. 330 and VI. 1830, p. 516.
Serranus nigriceps Cuvier & Valenciennes, o. c. VI. 1830, p. 517.
Serranus confertus Bennett, Life of Raffles 1830, p. 686.
Serranus merra Richardson, Ann. Mag. Nat. Hist. IX. 1842, p. 22.
Serranus stellans Richardson, l. c. p. 23.
Serranus hexagonatus Richardson, Voyage Sulphur. Zool. 1844, p. 82.
Perca hexagonata Forster, Descript. Animalium 1844, p. 189.
Serranus confertus Bleeker, Verh. Bat. Gen. XXII. 1849, Percoiden p. 4.
Serranus hexagonatus Cantor, Journ. Asiat. Soc. Bengal XVIII. 1850, p. 989.
Serranus hexagonatus Bleeker, Nat. Tijdschr. Ned. Indië VI. 1854, p. 191.
Serranus stellans Bleeker, Act. Soc. Indo-Neerl. I. 1856, Amboina p. 29.
Serranus hexagonatus Günther, Cat. Brit. Mus. I. 1859, p. 140 (pro parte).
Serranus merra Kaup, Ned. Tijdschr. Dierk. I. 1863, p. 21.
Serranus hexagonatus Kaup, ibid.
Epinephelus hexagonatus Bleeker, l. c. p. 232.
Serranus hexagonatus Kner, Novara-Exp. Fische 1865—1867, p. 25.
Epinephelus stellans Bleeker, Verh. Akad. Amsterdam XIV. N⁰. 2, 1874, p. 86. — Atl. ichth. VII. 1873—1876, p. 54.
Epinephelus merra Bleeker, l. c. p. 88 and Atl. ichth. t. c. p. 55.
Serranus hexagonatus Günther, Fische der Südsee 1873—1875, p. 7.
Serranus hexagonatus Day, Fishes of India 4⁰, 1878—1888, p. 14.
Serranus merra Macleay, Proc. Linn. Soc. N. S. Wales II. 1878, p. 346.
Serranus hexagonatus Steindachner & Döderlein, Denkschr. Akad. Wien XLVII. 1883, p. 232.
Serranus hexagonatus Perugia, Ann. Mus. Civ. Genova (2) VII. 1889, p. 270.
Epinephelus merra Boulenger, Cat. Brit. Mus. 2nd ed. I. 1895, p. 241.
Epinephelus merra Waite, Mem. Austral. Mus. III. 1899, p. 182.

Epinephelus hexagonatus Seale, Occas. Papers Bishop P. Bern. Mus. I. 1901, p. 77.
Epinephelus merra Steindachner, Abh. Senckenb. Naturf. Gesellsch. XXV. 1901, p. 414.
Epinephelus merra Steindachner, Sitzber. Akad. Wien CXV. 1906, p. 1377.
Epinephelus stellans Jordan & Seale, Bull. Bureau Fish. XXV. (1905) 1906, p. 258.
Epinephelus merra Jordan & Seale, ibid.
Epinephelus merra M. Weber, Siboga-Exp. Fische, 1913, p. 204.
Epinephelus hexagonatus Pellegrin, Bull. Soc. Zool. XXXIX. N⁰. 5, 1914, p. 224.
Epinephelus merra Jordan & Starks, Ann. Carnegie Mus. XI. 1917, p. 448.
Epinephelus merra Mc Culloch, Check-list of fish etc. of New South Wales Prt. II. 1919, p. 45.
Epinephelus merra Fowler & Bean, Proc. U. S. Nat. Mus. Washington LXII. 1922, p. 28.
Epinephelus merra Barnard, Ann. S. Afric. Mus. XXI. 1925—1927, p. 483.
Epinephelus merra Whitley, Rec. Austr. Mus. XVI. 1927, p. 12.
Serranus merra Fowler, Fish. of Oceania, Mem. Bern. P. Bish. Mus. X. 1928, p. 181.

D. XI. 15—17; A. III. 8; P. I. 16—17; V. I. 5; Ll. 95—102; L. tr. $\begin{array}{c}10\text{—}12\\ \hline 1\\ \hline 33\text{—}35\end{array}$.

Height 2.7—3.4, 3.4—4 in length with caudal. Head 2.3, 2.8—3 in length with caudal. Eye 5—5.4, slightly less than rather pointed snout. Interorbital space 1.5—2 in eye. Mouth somewhat oblique, maxillary reaching beyond posterior border of eye, its width at distal extremity 1.5—1.8 in eye. Praeopercular border rounded, slightly produced, serrated behind, the serrae at the angle coarser and longer. Middle opercular spine somewhat nearer lower than upper, the lower somewhat farther back than the upper. Teeth in rather narrow bands, in two series in the lower jaw, the inner row of hinged teeth much longer than the outer row of fixed teeth. Canines moderate, 11 and 3 or 4 rudiments in front in lower part of anterior arch. Dorsal originating above base of pectorals, third and fourth spines the longest, somewhat more or less than 2.5 in head, a little shorter than longest soft dorsal rays. Second anal spine as long as or a little longer than third spine, as long as third dorsal spine and much shorter than longest soft anal rays. Pectorals as long as or slightly shorter than postorbital part of head. Ventrals equal to distance between eye and point of middle opercular spine. Caudal feebly rounded. Scales of head cycloid, those of body ciliated. Head, body and fins covered with light brown spots, separated by a honeycombed network of light lines, some of the spots being darker may form crossbars on the body. One to three blackish blotches on the back at the base of the caudal and another on caudal peduncle may be present. The light lines of the network may be restricted to the points of the corners of the polygonal meshes, in which case the body is covered with light points. The dorsal spines are sometimes white at tip, followed by a black spot below. Length 320 mm.

Nom. indig.: Kerapo-tutōl (Malay. Batavia); Entai (Simalur, Tapah).

Habitat: Pinang; Pulu Weh!; Singapore; Sumatra (Benkulen, Tiku, Priaman, Trussan, Ulakan, Padang, Tikus isl.); Simalur!; Batu islands; Nias!; Java (Batavia, Prigi, Patjitan, Karangbollong); Muaras reef!; Borneo-bank!; Celebes (de Bril!; Makassar, Tanawanko, Tombariri, Menado); Saleyer!; Sula islands!; Sangir islands; Karkaralong!; Salibabu!; Sulu islands!; Binongka!; Letti; Flores!; Rotti!; Savu!; Solor!; Roma!; Timor!; Samau!; Damar!; Banda!; Lucipara!; Nusa laut!; Ambon!; Buru; Ceram; Obi major; Batjan; Ternate; Waigeu; Kei islands!; New Guinea (Doreh, North Coast!, Humboldt-bay!, Wilhemsland!); Mysore. — From the coast of Natal!, Madagascar, coasts of British India, Philippines, Formosa, China, Japan, coasts of Queensland and New South Wales, Pacific islands eastwards to Paumotu islands. In sea near reefs, young specimens also on reefs.

34. **Epinephelus caeruleopunctatus** (Bl.).

Holocentrus caeruleopunctatus Bloch, Ausländ. Fische IV. 1790, p. 94.
Serranus leucostigma Cuvier & Valenciennes, Hist. Nat. Poissons II. 1828, p. 346.
Serranus alboguttatus Cuvier & Valenciennes, l. c. p. 366.
Serranus summana Rüppell, Atlas Fische Roth. Meeres 1828, p. 104 (pro parte).
Serranus dermochirus Cuvier & Valenciennes, Hist. Nat. Poissons VI. 1830, p. 513.
Serranus Hoevenii Bleeker, Verh. Bat. Gen. XXII. 1849, Percoiden p. 36.
Serranus Kunhardtii Bleeker, Nat. Tijdschr. Ned. Indië II. 1851, p. 169.
Serranus hoevenii Günther, Cat. Brit. Mus. I. 1859, p. 138.
Epinephelus Hoevenii Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 232.
Serranus caeruleopunctatus Peters, Monatsber. Akad. Berlin 1865, p. 108.
Serranus hoevenii Playfair & Günther, Fishes Zanzibar 1866, p. 9.
Serranus sumana Klunzinger, Abhandl. zool. bot. Ges. Wien XX. 1870, p. 685. — Fische des Rothen Meeres 1884, p. 5 (pro parte).
Epinephelus Hoevenii Bleeker, Verh. Akad. Amsterdam XIV. N^0. 2, 1874, p. 110. — Atl. ichth. VII. 1873—1876, p. 63.
Epinephelus dermochirus Bleeker, in: Pollen & van Dam, Recherches sur la faune de Madagascar, Poissons 1875, p. 88.
Serranus tumilabris Day, Fishes of India 4^0, 1878—1888, p. 16 (nec C. V.).

Serranus dermochirus Day. o. c. p. 21.
Serranus hoeveni Day, Fauna India, Fishes I. 1889, p. 449.
Serranus alboguttatus Sauvage, Poissons de Madagascar 1891, p. 79.
Epinephelus caeruleopunctatus Boulenger, Cat. Brit. Mus. 2nd ed. 1895, p. 246.
Epinephelus summana de Beaufort, Bijdrage tot de Dierkunde XIX. 1913, p. 111. (nec Forsk.).
Epinephelus caeruleopunctatus Mc Culloch, Proc. Linn. Soc. N. S. Wales XLVI. Prt. 4, 1921, p. 468.
Epinephelus caeruleopunctatus Barnard, Ann. S. African Mus. XXI. 1925—1927, p. 485.
Serranus caeruleo-punctatus Fowler, Mem. Bern. P. Bish. Mus. X, 1928, p. 183.

D. XI. 15—16; A. III. 8; P. 1.16—17; V. I. 5; Ll. 93—96; L. tr. $\begin{array}{c} 11\text{—}14 \\ \hline 1 \\ \hline 33\text{—}37 \end{array}$.

Height 2.8—3, 3.5—3.6 in length with caudal. Head 2.3—2.4, 2.8—3 in length with caudal. Eye 4.6—5, its diameter equal to or a little less than snout. Interorbital space about half diameter of eye. Mouth slightly oblique, lower jaw projecting. Maxillary reaching to below posterior border of eye, its width at distal extremity 1.5—1.8 in diameter of eye. Praeopercular border rounded, serrated behind, the serrae somewhat enlarged at angle. Middle opercular spine nearer to lower than to upper, the lower one not further back than upper; opercular flap pointed, its upper border curved. Head covered with cycloid scales, maxillary naked. Gillrakers short, 10—11 and some rudiments on lower part of anterior arch. Dorsal originating above base of pectorals. Dorsal spine increasing in length to the third or fourth, which are one third of head, the last spine is scarcely shorter, the soft rays are considerably longer. Second and third anal spine equal, much shorter than longest dorsal spines. Pectorals as long as postorbital part of head, ventrals half diameter of eye shorter. Caudal rounded. Scales ctenoid. Colour of alcohol-specimens dark brown, with smaller and larger chalky white spots, edged with black and forming ocelli in young specimens. Maxillary groove edged with black. Fins with or without white spots, often with a white border, excepting the spinous dorsal.

Nom. indig.: Kerapo (Malay. Batavia).

Habitat: Sumatra (Padang!, Trussan, Ulakan, Priaman, Siboga, Benkulen); Nias; Java (Batavia, Karangbollong); Borneo; Bawean; Timor; Salibabu!; Saleyer!; Sangirislands; Ternate; Moluccos!; Buru; Ceram; Ambon!; Nusa laut!; Goram;

Misol; Waigeu!. — From coast of Natal, Madagascar, Zanzibar, Red Sea, coasts of British India to Japan, Queensland, Carolines, Solomons, Bismarck Arch., Marshall and Fidji islands.

Note. As has been clearly shown by Sauvage l.c. *Serranus alboguttatus* C. V. belongs to this species. Boulenger, who apparently has overlooked the statement of Sauvage, ranges it under *E. summana.*

35. **Epinephelus fuscoguttatus** (Forsk.).

Perca summana var. *fuscoguttatus* Forskål, Descript. Animal. 1775, p. 42.
Serranus horridus Cuvier & Valenciennes, Hist. Nat. Poissons II. 1828, p. 321.
Serranus fuscoguttatus Rüppell, Atl. Fische Roth. Meeres 1828, p. 108.
Serranus taeniocheirus Cuvier & Valenciennes, Hist. Nat. Poissons VI. 1830, p. 518.
Serranus lutra Cuvier & Valenciennes, o. c. VIII. 1831, p. 474.
Serranus lebretonianus Hombron & Jacquinot, Voyage Pôle Sud, Zool. III. Poissons 1846, p. 33.
Serranus horridus Bleeker, Verh. Bat. Gen. XXII. 1849, Percoid. p. 36.
? *Serranus Goliath* Peters, Monatsber. Akad. Berlin 1855, p. 430.
Serranus microdon Bleeker, Nat. Tijdschr. Ned. Indië XI. 1856, p. 86.
Serranus fuscoguttatus Günther, Cat. Brit. Mus. I. 1859, p. 127.
Epinephelus horridus Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 232.
Sebastes meleagris Peters, Monatsber. Akad. Berlin 1865, p. 392.
Serranus fuscoguttatus Kner, Novara-Exp. Fische I. 1865—1867, p. 22.
Serranus fuscoguttatus Playfair & Günther, Fishes of Zanzibar, 1866, p. 5.
Serranus dispar Playfair & Günther, o. c. p. 6.
Serranus fuscoguttatus Klunzinger, Abh. zool. bot. Ges. Wien XX. 1870, p. 684 — Fische des Rothen Meeres 1884, p. 4.
Serranus dispar Günther, Fische der Südsee 1873—1875, p. 9.
Epinephelus fuscoguttatus Bleeker, Verh. Akad. Amsterdam XIV. 1874, N⁰ 2, p. 93— Atl. ichth. VII. 1873—1876, p. 57.
Epinephelus microdon Bleeker, ll. cc. p. 95 — p. 57.
Epinephelus dispar Bleeker, in Pollen & van Dam, Fauna Madagascar, Poissons, 1875, p. 88.
Epinephelus lutra Bleeker, ibid.
Serranus fuscoguttatus Day, Fishes of India 4⁰, 1878—1888, p. 22.
Serranus fuscoguttatus Macleay, Descr. Cat. Austr. Fishes I. 1881, p. 16.
Epinephelus lutra Sauvage, Poissons de Madagascar, 1891, p. 70.
Epinephelus fuscoguttatus Boulenger, Cat. Brit. Mus. 2nd. ed. I. 1895, p. 249.
Epinephelus fuscoguttatus Steindachner, Abh. Senckenb. Naturf. Ges. XXV. 1901, p. 413.
Epinephelus fuscoguttatus Jordan & Seale, Bull. Bureau Fisheries XXV. (1905) 1906, p. 259.
Epinephelus fuscoguttatus Mc Culloch, Check-list of fish etc. of N. S. Wales Part II. 1919, p. 45.
Epinephelus fuscoguttatus Fowler & Bean, Proc. U. S. Nat. Mus. LXII, 1922, Art. 2, p. 28.
Epinephelus fuscoguttatus Barnard, Ann. S. Afric. Mus. XXI. 1925—1927, p. 485.
Serranus fuscoguttatus Fowler, Mem. Bern. P. Bish. Mus. X. 1928, p. 183.

D. XI. 14—15; A. III. 8; P. 1.18; V. I. 5; Ll. 110—114; L. tr. $\begin{array}{c}15\\ \hline 1\\ \hline 44\end{array}$.

Profile of head rather convex. Height 2.9, 3.4 in length with caudal. Head 2.5, 3 in length with caudal. Eye 6.4, about 1.5 in snout and equal to interorbital space. Mouth oblique, lower jaw projecting, maxillary reaching beyond posterior border of eye, its width at distal extremity not much less than diameter of eye. Praeoperculum obtusely rounded behind, finely serrated along its hindborder. Middle opercular spine nearer to lower than to upper one. Opercular flap blunt, its upper border very convex. Head nearly entirely covered with cycloid scales. Maxillary scaly. Ten moderate gillrakers, preceded by some rudiments on lower part of anterior arch. Dorsal originating above base of pectorals. Spines increasing in length to fourth, which is as long as fifth and sixth and 2.8 in head, somewhat shorter than longest soft dorsal rays. Last dorsal spine three fourths of longest ones. Second anal spine as long as or a little shorter than third one, two thirds of last dorsal spine and half as long as longest soft anal rays. Pectorals shorter than postorbital part of head, about twice in head, ventrals slightly shorter. Caudal rounded. Scales cycloid in the adult, ctenoid in the young. Colour of alcohol specimens light brown, covered with small darker spots on head, body, tail and fins. Irregular large dark blotches or bands at the base of the dorsal, another series of similar blotches sometimes along side of body, two diverging ones from behind eye to base of dorsal and to opercular flap and another one to maxillary. A black blotch on back of caudal peduncle. All these markings may get indistinct in adult specimens. Length 900 mm.

Nom. indig.: Kerapo-matjan, Kerapo-bebeh, Kakap bebeh (Malay.)

Habitat: Singapore; Pinang; Sumatra (Padang); Java (Batavia); Bawean; Borneo; Saleyer!; Damar!; Samau!; Timor; Ternate; Waigeu; New Guinea. — From the coast of Natal, Madagascar, Mauritius, Seychelles, Mossambique, Zanzibar, Red Sea, Persian Gulf, coast of British India, Andamans, Philippines, Formosa, China, Japan? (Karoli), north and north east coasts of Australia, eastwards to Paumotu islands.

36. **Epinephelus polyphekadion** (Blkr.).

Serranus polyphekadion Bleeker, Verh. Bat. Gen. XXII. 1849, Perc. p. 39. — Nat. Tijdschr. Ned. Indië VII. 1854, p. 417.
Serranus Goldmani Bleeker, Nat. Tijdschr. Ned. Indië IX. 1855, p. 434.
Serranus polyphekadion Günther, Cat. Brit. Mus. I. 1859, p. 128.
Epinephelus polyphekadion Bleeker, Verh. Akad. Amsterdam XIV. N⁰. 2, 1874, p. 97. — Atl. ichth. VII. 1873—1876, p. 58.
Epinephelus Goldmani Bleeker, ll. cc. p. 99. — p. 59.
Epinephelus polyphekadion Boulenger, Cat. Brit. Mus. 2nd. ed. 1895, p. 240.

D. XI. 14; A. III. 8; P. 1.14—15; V. I. 5; Ll. 95—96; L. tr. $\begin{array}{c}11-15\\\hline 1\\\hline 50\end{array}$.

Height 2.6—3.1, 3.2—3.8 in length with caudal. Head 2.2, 2.6 in length with caudal. Eye 5.5—6.3 in head, 1.1—1.3 in snout. Interorbital space 1.2—1.7 in diameter of eye. Maxillary scaly, reaching beyond hindborder of eye or not so far, its width at distal extremity 1.3—1.7 in diameter of eye. Praeopercular border rounded, the serrae at its angle very much enlarged. Middle opercular spine nearer to lower than to upper, lower not further back than upper. Opercular flap obtusely pointed. Gillrakers 10—11 on lower part of anterior arch, much shorter than filaments. Teeth in two rows on sides of mandibles. Fourth dorsal spine longest, 3—3.2 in head, somewhat shorter than longest soft dorsal rays. Last dorsal spine 1.1—1.3 in longest dorsal spine. Second anal spine equal to or somewhat longer than third one, somewhat shorter than last dorsal spine and much shorter than soft anal rays. Pectorals equal to distance between eye and middle opercular spine. Ventrals shorter. Caudal rounded. Scales cycloid on head, feebly ctenoid or cycloid on body. Colour of alcohol-specimens brown, dotted with darker brown, including the fins. A dark patch on the back of the caudal peduncle and sometimes also on the back below dorsal fin. Length 360 mm. [Types of *S. polyphekadion* and *S. goldmani* in the Leiden Museum seen by us].

Nom. indig.: Kerapo bebeh (Malay.).

Habitat: Java (Batavia!); Obi major! — In sea.

37. **Epinephelus lanceolatus** (Bl.).

Holocentrus lanceolatus Bloch, Ausländ. Fische IV. 1790, p. 92.
Holocentrus lanceolatus Russell, Fish. Corom. II. 1803, p. 23.
Serranus lanceolatus Cuvier & Valenciennes, Hist. Nat. Poissons II. 1828, p. 316.

Serranus geographicus Cuvier & Valenciennes, o. c. p. 322.

Serranus geographicus Bleeker, Verh. Bat. Gen. XXII. Percoïden, 1849, p. 3.

Serranus lanceolatus Bleeker, l. c. p. 35.

Serranus lanceolatus Cantor, Journ. Asiat. Soc. Bengal XVIII. 1850, p. 990.

Serranus horridus Cantor, l. c. p. 991 (nec C. V.).

Serranus lanceolatus Günther, Cat. Brit. Mus. I. 1859, p. 107.

Serranus horridus Günther, l. c. p. 136 (nec C. V.).

Serranus lanceolatus Day, Fishes Malabar 1865, p. 4. — Proc. Zool. Soc. London 1869, p. 512. — l. c. 1871, p. 635.

Serranus lanceolatus Playfair & Günther, Fishes Zanzibar, 1866, p. 4.

Batrachus (*gigas*?) Günther, Ann. Mag. Nat. Hist. (4) III. 1869, p. 132.

Batrachus gigas Ward, l. c. p. 352.

Epinephelus lanceolatus Bleeker, Verh. Akad. Amsterdam XIV. N⁰. 2, 1874, p. 73. — Atl. ichth. VII. 1873—1876, p. 49.

Serranus lanceolatus Day, Fishes of India 4⁰, 1878—1888, p. 18, p. 101.

Epinephelus lanceolatus Boulenger, Cat. Brit. Mus. 2nd ed. 1895, p. 251.

Promicrops lanceolata Jordan & Evermann, Proc. U. S. Nat. Mus. XXV. 1902, p. 342.

Epinephelus lanceolatus Mc Culloch, Check list of fish etc. of N. S. Wales, Part II. 1919, p. 45.

Serranus lanceolatus Hora, Mem. Asiat. Soc. Bengal VI. 1924, p. 486.

Epinephelus lanceolatus Barnard, Ann. S. Afric. Mus. XXI. 1925—1927, p. 486.

Serranus lanceolatus Fowler, Fishes of Oceania, Mem. Bernice P. Bish. Mus. X. 1928, p. 184.

D. XI. 14—15; A. III. 8; P. 1.16; V. I. 5; Ll. 95; L. tr. $\begin{array}{c}14\\ \hline 1\\ \hline 38\end{array}$.

Height 2.8, 3.5 in length with caudal. Head 2.3, 2.9 in length with caudal. Eye small, 6.5—12 (old specimens), equal to or less than interorbital space and about 1.5 in snout. Lower jaw somewhat projecting, mouth oblique, maxillary reaching beyond posterior border of eye, the width of its distal extremity somewhat less than, equal to, or even more than diameter of eye. Praeoperculum obtusely rounded, its hind-border finely serrated. Teeth rather small, in narrow bands in the young, in broad bands in the adult. Gillrakers moderate, 10—11 and some rudiments on lower part of anterior arch. Middle opercular spine nearer to lower than to upper. Opercular flap obtusely pointed, its upper border strongly curved. Dorsal originating above base of pectorals, spines short and excepting the two anterior ones almost of equal length, a little less or more than 5 times in head and two thirds of longest soft dorsal rays. Second anal spine a little shorter than third one, 5 times in head and half as long as longest soft anal rays. Pectorals equal to postorbital part of head, ventrals one eye-diameter longer. Caudal rounded. Scales cycloid. Colour of young alcohol specimens light reddish brown, with very broad dark brown crossbands the first one through eye, the second one through operculum both joining above and below, leaving the cheeks light brown. Upper part of head also darkbrown. Third through spinous dorsal to ventrals, joined with the second through a horizontal band above pectorals. Fourth from soft dorsal to anal, fifth through caudal peduncle. Pectorals, soft dorsal, soft anal and caudal with black bars, more or less broken up into round spots. In older specimens the bands disappear and the body is reticulated with dark brown, the meshes of the network enclosing lighter spots and the spots on the fins are more numerous. Old specimens uniform brown. Grows to more than 3000 mm.

Nom. indig.: Kerapo-bebeh (Malay.).

Habitat: Pinang; Singapore; Sumatra (Padang); Banka; Java (Batavia, Semarang); Flores! Borneo (Balikpapan!); Celebes (Makassar); Goram. — West coast of Africa?, east coast of Africa, Mauritius, Zanzibar, Seychelles, coast of British India and Siam, Formosa, New South Wales, Gilbert Islands, Hawaii. In sea, entering rivers.

38. **Epinephelus rahanus** Popta.

Epinephelus rahanus Popta, Mededeelingen Mus. Leiden 1918, p. 2.

D. XI. 16; A. III. 8; P. 1.15; V. I. 5; Ll. 88; L. tr. $\begin{array}{c}14\\\hline 1\\\hline 42—46\end{array}$.

Height 2.7—2.9, head 2.4—2.6. Eyes 4.7—5.1, interorbital space 5.4—5.6 in head, snout 4.1—4.2 in head. Maxillary, without scales, reaching beyond posterior border of eye, its width at distal extremity $^5/_7$—$^3/_4$ of the diameter of the eye. Praeopercular border with short serrae. Middle opercular spine nearer lower than upper. Opercular flap pointed, its upper border convex anteriorly, concave posteriorly. Dorsal beginning above base of pectorals. The spines, beginning by the third, are of almost equal length and 2.8—3.1 in head. Second and third anal spines subequal, 3—3.4 in head. Pectorals equal to postorbital part of head, ventrals somewhat shorter. Caudal rounded. Scales of head cycloid, scales of body ctenoid, excepting those immediately behind operculum and on base of caudal. Colour of alcohol-specimens dark brown, soft dorsal, anal and caudal with small white spots, pectorals with dark spots. All these fins with a white margin. Length 340 m.m. [A typical specimen seen by us in the Leiden Museum].

Habitat: Muna (Raha!).

Doubtful species.

39. **Epinephelus goldiei** (Macleay).

Serranus Goldiei Macleay, Proc. Linn. Soc. New S. Wales VII. 1882, p. 226.
Epinephelus goldiei Jordan & Seale, Bull. Bureau Fisheries XV. (1905) 1906, p. 260.
Serranus goldiei Fowler, Fish. of Oceania, Mem. Bern. P. Bish. Mus. X. 1928, p. 179.

D. 10/14. A. 3/7.

Of elongate slightly compressed form; the height of the body is one fourth of the total length including the caudal fin, the length of the head from the extremity of the lower jaw to the end of the opercular flap is nearly equal to the distance from the flap to the commencement of the caudal fin; the profile of the head is a little convex near the snout, the space between the eyes is a little depressed and as wide as the diameter of the orbit; the eyes are large, about two diameters from the extremity of the lower jaw, and more than four from the point of the opercular flap. The teeth are strong, numerous and sharp on the jaws, vomer and palatine bones, with two strong canines on each side of each jaw placed outside of the others and very close together; the maxillary bone is very broad at its extremity and extends far beyond the vertical from the hindmargin of the eye; the praeoperculum is rounded behind with a slight emargination above the angle, but no apparent serrations; the middle spine of the operculum is long and acute, the others are distant from it and very small. The scales are smal all over the body and the lateral line is almost straight. The dorsal fin commences opposite the root of the pectorals, the spines are tolerably strong but not long, the first is the shortest, and from the fourth onwards the longest; the soft dorsal is more elevated than the spinous; the caudal fin is slightly rounded behind; the anal has the first spine short and the third a little longer than the second, the rays are much longer, and the posterior ones are inserted a very little in advance of the last of the dorsal; the ventral fins take their rise behind the root of the pectorals, and do not reach to the extremity of them; the pectorals are large, spreading and rounded and are inserted in a line with the large opercular spine. The colour in spirits is yellowish-brown covered all over — head, fins and all — with pale brown spots, smaller than the interspaces, two spots of a large size show on the back, one about the end of the spinous dorsal, the others over the tail; the pectorals are more sparsely spotted except at the base. Length about 400 mm. [Description after MACLEAY].

Habitat: New Guinea. — New Caledonia.

Note: It is impossible to give this species its correct place among the others of the genus as some important points are wanting in the description viz. the number of scales, the exact position of the opercular spines etc. As Macleay had only one specimen, not to much stress can be laid on the finformulae D. X. 14 and A. III. 7. Ten dorsal spines as well as 7 soft anal rays occur as an abnormality in species which have D. XI and A. III. 8 as a rule. The praeopercular border is stated to be smooth, this is a very great exception: in some very large specimens the serrae of the praeoperculum may get indistinct, but in all indo-australian species they are well developed, at least in those with eleven dorsal spines.

The species may be near *E. dämeli* Gthr. on account of the width of the interorbital space. The blotch on the caudal peduncle, although also present in other species, points also in that direction.

40. **Epinephelus magnificus** (Macleay).

Serranus magnificus Macleay, Proc. Linn. Soc. New South Wales VII. 1882, p. 229.
Epinephelus magnificus Jordan & Seale, Bull. Bureau Fisheries XXV. (1905) 1906, p. 260.
Serranus magnificus Fowler, Fish. of Oceania, Mem. Bern. P. Bish. Mus. X. 1928, p. 180.

D. 11/16. A. 3/9.

Of a broad slightly compressed form, the height of the body is comprised three and a half times in the total length, the length of the head three times; the snout is short, broad and rounded, distant from the eye, which is small, about one diameter of the orbit; the space between the eyes is broad and almost flat; the maxillary bone reaches to beyond the vertical from the posterior margin of the eye, and is triangular behind with rounded angles; the canine teeth are rather small; the praeoperculum is rounded, raggedly serrated, and densely covered with very minute scales; the opercular spines are obtuse, the middle one large and flat, the spines of the dorsal fin are strong and excepting the first two, are of nearly equal height, the soft dorsal is much higher and is rounded posteriorly; the caudal fin is large and expanded, densely covered with minute scales and rounded at the apex; the anal fin is more pointed-looking behind than the soft dorsal, the spines are short, the third largest; the pectorals are large, round and expanded; the ventrals are much shorter. The general colour seems to have been of an olive-green with numerous lighter patches all over, turning yellow on the belly; all the fins are of a yellowish ground-colour, with very numerous large brown spots presenting as Mr. Goldie observes the appearances of tortoise-shell, the pectorals have two cross bars of the same colour at their base before the commencement of the spots. [Description after MACLEAY, not seen by us].

Length of single specimen 450 mm. It is of a heavy bulky appearance.

Nom. indig.: „Balala".

Habitat: New Guinea.

Note: The description is too incomplete to give this species its right place in the genus. It seems to be like *E. nebulosus*, differing by having one ray more in the soft anal and the praeopercular border rounded. Moreover *E. nebulosus* is a species only known from the Western part of the indo-australian Archipelago and its occurrence on New Guinea is therefore not probable.

Doubtful species as to locality.

Epinephelus chlorocephalus (C. V.) has been described by Cuvier & Valenciennes, Hist. Nat. Poissons VI. 1830, p. 522 from Tongatabu. The type specimen has been redescribed by Boulenger, Cat. Brit. Mus. 2nd. ed. I. 1895, p. 217. As far as we know, no other specimens have been mentioned in literature. We think therefore that Jordan & Seale made a mistake, when they give the habitat of this species (Bull. Bureau Fisheries XXV. (1905) 1906, p. 259) as: „Tonga; East Indies".

3. Plectropoma Cuvier.

(Cuvier Règne animal II, 1817, p. 277)
Plectropoma Cuvier & Valenciennes, Hist. nat. Poiss. II. 1828, p. 387 (p.p.) — Günther, Cat. Brit. Mus. I. 1859, p. 156 (p.p.) — *Paracanthistius* Bleeker, Révis. *Epinephelini*, Verh. Akad. Amsterdam XIV. (1873) 1874, p. 13.

Elongate, compressed, covered by rough, in youth ciliated scales. Lateral line complete, arched below spinous dorsal. Head convex, naked on front, snout and praeorbital bone; cheeks and opercles covered with small scales. Mouth large, protractile; maxillary exposed, with supplemental bone, posteriorly scaly; lower jaw prominent, scaly. Gillmembranes separate, seven branchiostegals; pseudobranchiae present; gillrakers moderately long. Praeoperculum rounded, its hindborder nearly entire, its lower border with three to four antrorse, pointed spines; operculum with three equidistant flat spines. Intermaxillary with a narrow band of cardiform teeth, broader anteriorly, with a canine; mandibulary teeth, unequal, in two series in front and laterally with strong canines; the inner series in both jaws depressible and hinged. Vomer with a pluriseriate, palatines with a slender band of teeth, tongue edentulous. The single dorsal in a furrow, the spinous portion with six to eight slender spines, nearly as long as the rounded soft-rayed portion, which has eleven to twelve rays. Anal short, with three spines and eight rays, the spines flexible and feeble, the first often covered by skin. Pectorals rounded with 16 rays; ventrals below pectorals, with a slender, feeble spine. Caudal truncate in young, emarginate, with acute angles in old specimens and 15 divided rays.

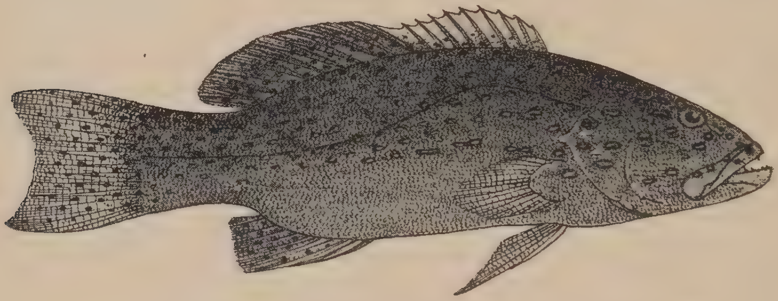

Fig. 8. *Plectropoma maculatum* (Bl.) $^1/_4$ nat. size.

Distribution: Marine, littoral fishes, attaining large size; from Red Sea and the East African coast to Pacific Islands.

Note: The genus as originally formed by Cuvier under the name „Plectropomes", contained three species *Holocentrus calcarifer* Bloch, *Bodianus maculatus* Bl. and Bodian cyclostome Lac. The first was by Cuvier & Valenciennes (Hist. Nat. Poiss. II. 1828, p. 88) placed in their genus *Lates*. The third species is a synonym of the second. This second species „*maculatus*" was retained by Cuvier & Valenciennes in their genus *Plectropoma*, which contains besides *Pl. melanoleucum*, *leopardinum*, *maculatum*, other species which are meanwhile brought into other genera. As *calcarifer* is the species first named by Cuvier in his *Plectropoma*, Bleeker was right in pretending, that this generic name ought to have been chosen for *calcarifer* instead of the name *Lates* C. V.; in which case an other name had to be framed for the remaining species of *Plectropoma*. Bleeker proposed the name *Paracanthistius*. But by Cuvier & Valenciennes themselves and all subsequent writers, the name *Plectropoma* was retained for them. We follow therefore the common use.

Key to the indo-australian species of Plectropoma.

1. 7 to 8 dorsal spines. Soft-rayed dorsal and anal obtusely rounded . . . . *Pl. maculatum* p. 77.
2. 6 to 7 dorsal spines. Soft-rayed dorsal and anal distinctly emarginate . . . . *Pl. oligacanthus* p. 79.

1. **Plectropoma maculatum** (Bl.) [Fig. 8, p. 76].

Bodianus maculatus Bloch, Ausl. Fische IV, 1790, p. 48.
Labrus laevis Lacépède, Hist. nat. Poiss. III. 1802, p. 431, 477.
Bodianus maculatus Lacépède, l. c. IV. 1802, p. 280, 293.
Bodianus cyclostomus Lacépède, l. c. p. 282, 293.
Bodianus melanoleucus Lacépède, l. c. p. 283, 296.
Holoeentrus leopardus Lacépède, l. c. p. 332, 367.
Plectropoma punctatum Quoy & Gaimard, Voy. Uranie & Physicienne 1824, p. 318.
Plectropoma melanoleucum Cuvier & Valenciennes, Hist. nat. Poiss. II. 1828, p. 392.
Plectropoma leopardinum Cuvier & Valenciennes, l. c. p. 392.
Plectropoma maculatum Cuvier & Valenciennes, l. c. p. 393.
Plectropoma areolatum Rüppell, Atl. Fische Roth. Meer 1828, Appendix p. 2.

Plectropoma cyanostigma Bleeker, Nat. & Geneesk. Arch. Ned. Indië (3) II. 1845, p. 525.

Plectropoma leopardus Richardson, Rep. Ichth. China, Brit. Assoc. (1845) 1846, p. 230.

Plectropoma maculatum Bleeker, Verh. Bat. Gen. XXII. 1849, Percoïd. p. 39.

Plectropoma leopardinus Bleeker, Nat. Tijdschr. Ned. Ind. VII. 1854, p. 420.

Acanthistius maculatus Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 232.

Plectropoma maculatum Playfair, in Playfair & Günther, Fishes of Zanzibar, 1866, p. 12.

Acanthistius leopardinus Bleeker, Ned. Tijdschr. Dierk. IV. 1873, p. 138.

Paracanthistius leopardinus Bleeker, Révis. *Epinephelini*, Verh. Akad. Amsterdam XIV. (1873), 1874 p. 14 — Atl. ichth. VII. 1873—1876, p. 25.

Paracanthistius maculatus l. c. p. 16 — l. c. p. 26.

Plectropoma maculatum Boulenger, Cat. Percif. Fish. I. 1895, p. 160 (references & synonyms).

Plectropoma pessuliferum Fowler, Journ. Acad. Nat. Sci. Philadelphia (2) XII, 1904, p. 520.

Plectropoma maculatum Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 469.

Plectropoma maculatum leopardus Whitley, Austral. Zoologist IV. 4, 1926, p. 229.

Paracanthistius maculatus Fowler, Fish. Oceania, Mem. Bishop Mus. X, 1928, p. 172.

D. VII—VIII. 11—12; A. III. 8; P. 1.15; V. I. 5; Ll. 80—110; L. tr. $\frac{15-20}{40 \text{ — nearly } 80^{1)}}$

Height equal to or a little less than length of head, 3.25 to nearly 4 in length, about 4.75 in length with caudal. Eye 5 to more than 7. Snout about half diameter longer than eye. Maxillary reaching below centre or posterior border of eye. Antrorse spines on lower border of praeoperculum less distinct in old specimens. Dorsal originating somewhat behind base of pectorals, its spinous portion with rather slender spines, the middle ones the longest, $3-3^{1}/_{2}$ in height of body; soft portion somewhat shorter but higher than the spinous portion, obtusely rounded; the longest rays twice or somewhat more longer than height of body. Anal with 3 approximate spines, the third the longest, the first more or less rudimentary. Pectorals asymmetrically rounded, equal to or somewhat shorter than postocular part of head. Ventrals of about equal size, their spine slender, much longer than eye. According to PLAYFAIR (1866) the colour is subject to very great diversities, without the slightest structural divergence; it is still obscure whether sex has any influence on the colouration of which seven varieties have been distinguished, which however pass into one another. Generally there are on the yellowish, grey or brownish groundcolour blue, dark edged ocelli, which are small and

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1) According to different height of body.

numerous or less numerous but larger, some of them elongate and streak-like; or there appear five dark brown or blackish crossbands, between the eyes, across the nape, below the anterior dorsal spines, the fourth below the last three dorsal spines, the fifth below the dorsal rays. Traces of these bands may be combined with ocelli, or both may be wanting and the body clouded. The fins are bright yellow, the pectorals and ventrals with large black spots at the base, or they are covered with ocelli, or the spinous dorsal has black spots. Length exceeding 1000 mm.

Nom. indig.: Laiidi, Kakap-bebeh (Mal.).

Habitat: Singapore; Sumatra (Padang); Java (Batavia); Celebes (Macassar!); Saleyer!; Halmaheira; Ternate; Mysore; New Guinea. — Red Sea, Zanzibar, Mozambique, Mauritius, Ile de France, Seychelles, Ceylon, China, Japan, Australia (Cape York, Port Denison, Fair Cape, Queensland), Wilson Islet and Northwest Islet, Capricorn Group, Louisiades, Pelew Islands, Ellice Island, Levuka, Fiji, Paumotu Archipelago, Samoa. — Costal marine fish, much valued as food.

2. **Plectropoma oligacanthus** Blkr.

Plectropoma oligacanthus Bleeker, Nat. Tijdschr. Ned. Indië VII. 1854, p. 422.
Plectropoma oligacanthus Günther, Cat. Brit. Mus. I. 1859, p. 157.
Acanthistius oligacanthus Bleeker, Ned. Tijdschr. Dierk. II. 1865, p. 281.
Paracanthistius oligacanthus Bleeker, Révis. Epinephelini, Verh. Akad. Amsterdam XIV. (1873) 1874, p. 19 — Atl. ichth. VII. 1873—1876, p. 27.
Plectropoma oligacanthus Boulenger, Cat. Percif. Fish. I. 1895, p. 162.

D. VI—VII. 11—12; A. III. 8.

Differs from the preceding species in the somewhat minor number of dorsal spines and perhaps in the minor number of longitudinal series of scales, but distinctly in the strong emargination of the border of the soft-rayed dorsal and, but somewhat less, of the soft anal. Colour reddish-violet on back, belly red. Head with longitudinal blue lines, continued on anterior half of back, on flanks with vertical lines downward; hinder half of body and belly with blue spots. Fins with similar longitudinal lines. Pectorals bordered with yellow. Length 550 mm. [Not seen by us].

Nom. indig.: Laiidi, Kakap-bebeh (Mal.).

Habitat: Java (Batavia); Celebes (Menado); Ambon. — Caroline Islands. In sea.

4. **Anyperodon** Günther.

(Günther, Cat. Brit. Mus. I. 1859, p. 95)

Serranus sp. Cuvier & Valenciennes, Hist. nat. Poiss. II. 1828, p. 347.

Elongate, compressed, covered with small, ciliated scales. Lateral line complete, strongly curved below the six anterior dorsal spines. Head pointed, entirely scaly, also the mandible and the hinder part of the maxillary. Mouth large, protractile, the lower jaw the longest. Maxillary exposed, with supplemental bone. Praeoperculum rounded, its hindborder and angle finely denticulated, operculum with three spines. Gill-membranes separate; seven branchiostegals; pseudobranchiae present, gillrakers long. Teeth in broad villiform bands, anteriorly the inner ones depressible and hinged, a small canine in front of upper jaw, none in lower. Similar teeth on vomer in Λ formed band, none on palatines and tongue. One dorsal with eleven spines and fourteen to fifteen rays, the spinous portion much longer than the soft-rayed. Anal short with three spines and eight to nine rays; both fins are scaled. Caudal rounded, with 15 divided rays. Pectorals short with 16 to 17 rays; ventrals inserted below pectorals, close together, with a strong spine. „Posterior processes of intermaxillaries extending to between the frontals, which are hollowed out anteriorly; knoblike processes on posterior part of frontals; supraoccipital bone extending to between posterior margins of orbits, parietals to between postfrontal processes; parietal and supraoccipital crests very feeble, not extending to the anterior extremity of the bones. Vertebrae 24 (10 + 14)" [Boulenger].

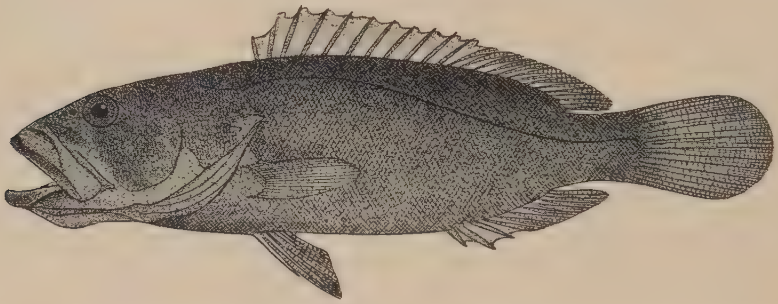

Fig. 9. *Anyperodon leucogrammicus* C. V. $^1/_3$ nat. size; specimen without markings.

Distribution: Marine, littoral fishes of the tropical indo-pacific region.

Key to the known species of Anyperodon.

1. Caudal peduncle as high as long; second and third anal spine about subequal; anal with 9 rays. Body with 3 to 5 bluish or white longitudinal stripes and darkbrown spotted dorsal and caudal . . . 1. *A.leucogrammicus* p. 81.
2. Caudal peduncle higher than long; second anal spine distinctly longer than the third; anal with 8 rays. Body with alternating longitudinal blue and red stripes; fins without spots, a black blue-encircled ocellus at upper base of caudal . . . . . 2. *A. urophthalmus* p. 82.

1. **Anyperodon leucogrammicus** (C. V.) [Fig. 9, p. 80].

Serranus leucogrammicus Cuvier & Valenciennes, Hist. nat. Poiss. II. 1828, p. 347.
Serranus leucogrammicus Bleeker, Nat. Geneesk. Arch. Ned. Indië (3) II, 1845, p. 525. — Bijdr. kennis Percoïden, Verh. Batav. Gen. XXII. 1849, p. 33.
Anyperodon leucogrammicus Günther, Cat. Brit. Mus. I. 1859, p. 96.
Epinephelus leucogrammicus Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 232.
Anyperodon leucogrammicus Playfair, Proc. Zool. Soc. London 1867, p. 846.
Anyperodon leucogrammicus Bleeker, Verh. Akad. Amsterdam XIV. (1873) 1874, p. 22. — Arch. néerl. Sc. nat. XI. 1876, p. 256 — Atl. ichth. VII. 1873—1876, p. 28.
Anyperodon leucogrammicus Sauvage, Poiss. Madagascar 1891, p. 83.
Anhyperodon leucogrammicus Boulenger, Cat. Percif. Fish. I. 1895, p. 270.
Anyperodon leucogrammicus Jordan & Seale, Fish. Samoa, Bull. Bureau fish. XXV. (1905) 1906, p. 257.

D. XI. 14—15; A. III. 9; L.l. 75—85; L. tr. $\frac{12-15}{55-65}$.

Height 3.4—3.6 in length, 3.75 to more than 4 in length with caudal. Head 2.6—2.8 in length, more than thrice in length with caudal. Eyes 6—6.5 in head, 1.5 to 1.8 times in length of snout, interorbital space half or more their diameter. Maxillary surpassing hindborder of eye. Origin of dorsal above base of pectorals; its moderate spines increase in size from the second to the fifth, which is the longest and equal about $^1/_4$ to $^1/_3$ the length of the head and is longer than the longest soft rays; the remaining spines are shorter than the rounded soft portion. Anal of similar structure, its second and third spine usually subequal and rather strong. Pectorals with 16 rays, about equal to postocular part of head and somewhat longer than ventrals, which are inserted below base of pectorals and have a strong spine. Least height of caudal peduncle equals its length. Colour brownish with 3 to 5 bluish or white stripes on body, three of which reach caudal. Head, sides of body, dorsal and caudal with more or less numerous rounded brown spots. In full-grown specimens these stripes and spots become indistinct or disappear. Length 520 mm.

Nom. indig.: Kerapo (Malay.).

Habitat: Singapore; Java (Batavia); North Celebes; Flores; Timor; Ternate; Banda!; Buru; Ambon!; Gisser Island!; Mysore; New Guinea. — Zanzibar, Madagascar, Seychelles, Samoa, Ponape, Carolines, New Hebrides, Ellice Islands.

2. **Anyperodon urophthalmus** (Blkr.).

Serranus urophthalmus Bleeker, Nat. Tijdschr. Ned. Indië VIII. 1855, p. 310.
Serranus urophthalmus Günther, Cat. Brit. Mus. I. 1859, p. 155.
Anyperodon urophthalmus Bleeker, Verh. Akad. Amsterdam XIV. (1873) 1874, p. 23 — Atl. ichth. VII. 1873—1876, p. 29.
Epinephelus urophthalmus Bleeker, Atl. ichth. VII. 1873—1876, Tab. 290, fig. 3.
Anhyperodon urophthalmus Boulenger, Cat. Percif. Fish. I. 1895, p. 271.

B. 7; D. 11/15 vel 11/16; P. 2/14; V. 1/5; A. 3/8 vel 3/9; C. 1/15/1 et lat. brev.

„Anyper. corpore oblongo compresso, altitudine $3^2/_5$ circ. in ejus longitudine absque-, $4^1/_5$ circ. in ejus longitudine cum pinna caudali; latitudine corporis $2^1/_2$ fere in ejus altitudine; capite $3^2/_3$ circ. in longitudine corporis absque-, $3^1/_6$ circ. in ejus longitudine cum pinna caudali; altitudine capitis $1^2/_3$ circ., latitudine capitis 3 circ. in ejus longitudine; linea rostro-frontali rectiuscula vel convexiuscula; oculis diametro $4^1/_2$ ad $4^3/_5$ in longitudine capitis, diametro $^1/_2$ circ. distantibus; linea interoculari convexiuscula; naribus anterioribus brevitubulatis naribus posterioribus rotundiusculis minoribus; rostro squamoso, absque maxilla oculi diametro non vel vix breviore; osse suborbitale sub oculo pupillae diametro duplo circiter humiliore, squamato; maxilla superiore squamulata maxilla inferiore conspicue breviore, post oculum desinente, 2 circ. in longitudine capitis; osse intermaxillari dentibus pluriseriatis lateralibus subaequalibus, anterioribus seriebus internis ceteris longioribus mobilibus, antice insuper canino parvo; osse inframaxillari dentibus antice pluriseriatis serie interna ceteris longioribus mobilibus; dentibus vomerinis pluriseriatis in vittam $\wedge$-formem dispositis; praeoperculo rotundato margine posteriore denticulis sat numerosis medio-

cribus angularibus 2 vel 3 ceteris conspicue majoribus, inferne denticulis nullis; suboperculo et interoperculo dentibus conspicuis nullis; operculo spinis 3, inferioribus 2 subaequalibus spina superiore multo majoribus; linea laterali valde curvata apice curvaturae anterioris spinae dorsi 5ae circ. opposito; squamis operculo mediis squamis postaxillaribus non majoribus; squamis corpore ciliatis angulum aperturae branchialis superiorem inter et basin pinnae caudalis supra lineam lateralem in series 105 ad 110 transversas, infra lineam lateralem in series 100 circ. transversas dispositis; squamis 65 circ. in serie transversali basin pinnae ventralis inter et pinnam dorsalem, 11 vel 12 lineam lateralem inter et spinam dorsi 5m vel 6m; squamis regione scapulo-postaxillari squamis mediis lateribus vix majoribus; cauda parte libera paulo altiore quam longa; pinna dorsali spinosa spinis mediocribus, 3a et 4a ceteris longioribus 2 circ. in altitudine corporis, membrana inter singulas spinas mediocriter incisa non lobata; dorsali radiosa obtusa rotundata dorsali spinosa non vel vix altiore radiis longissimis 2 circ. in altitudine corporis; pectoralibus capitis parte postoculari longioribus; ventralibus acutiusculis capitis parte postoculari brevioribus, spina oculo duplo circ. longiore; anali spina media spinis ceteris multo et oculo duplo circiter longiore, parte radiosa obtusa rotundata dorsali radiosa breviore sed non humiliore; caudali rotundata capitis parte postoculari longiore; colore corpore carmosino; vittis utroque latere cephalo-caudalibus subaequidistantibus coeruleis et fuscescente-rubris alternantibus violaceo limbatis dorso curvatis lateribus rectis horizontalibus; rostro apicem versus utroque latere macula nigricante; iride rosea margine pupillari aurea; pinnis aurantiacis vittis vel maculis nullis; caudali tantum basi superne macula rotunda nigra coeruleo annulata. Longitudo speciminis unici 95 mm." [After BLEEKER, not seen by us].

Habitat: Insula Batu, in mari.

Note: Boulenger expresses the opinion that „this supposed species is founded perhaps merely on the young of *leucogrammicus*". This is not probable as a young specimen of 137 mm. length caught at Banda by the Siboga Expedition belongs without doubt to *A. leucogrammicus* and differs from *A. urophthalmus*.

5. Cromileptes Swainson

(Swainson, Nat. Hist. Fish. II. 1839, p. 201 [1]))

Serranus Cuvier & Valenciennes, Hist. nat. Poiss. II. 1828, p. 324 (p. p.).
Serranichthys Bleeker, Visschen Duizend-eilanden, Nat. Tijdschr. Ned. Indië VIII. 1855, p. 344 [2]).

Body strongly compressed, elevated, covered with very small cycloid scales. Lateral line complete, extending on basal half of caudal, strongly arched below spinous dorsal. Head concave, entirely covered with very small scales; mandible and intermaxillary naked, maxillary at its margin with a narrow stripe of scales. Mouth large, oblique, protractile; lower jaw prominent; maxillary exposed, with supplemental bone. Praeoperculum serrated, the strongest teeth at the rounded angle, operculum with two feeble spines. Gillmembranes separate; seven branchiostegals; gillrakers short, lanceolate. Teeth in jaws in broad villiform bands, the inner ones depressible and hinged at base, the middle ones of the outer series somewhat

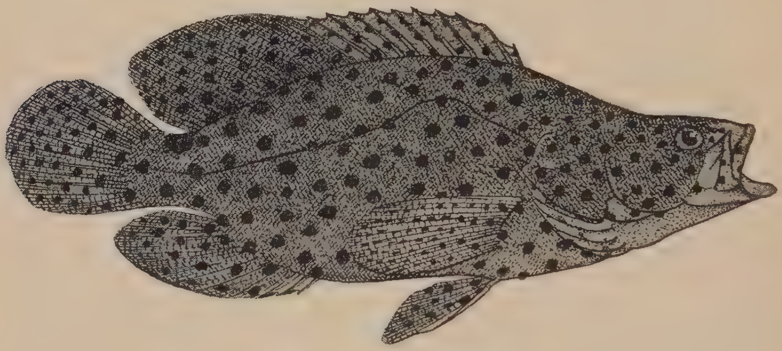

Fig. 10. *Cromileptes altivelis* (C. V.) $^1/_4$ nat. size.

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[1] The genus *Cromileptes* of Swainson comprises also the fishes belonging to *Epinephelus*, but as the first species he quotes is *C. altivelis*, his generic name may be used for it.

[2] Bleeker has repeatedly, in five succeeding papers between the years 1855 and 1862, for the first time in the above quoted paper, used the name *Serranichthys altivelis* Blkr. = *Cromileptes altivelis* Swainson, but he *never gave a definition* of his *genus Serranichthys*. In his „Systema percarum revisum, Arch. néerl. Sc. nat. XI. 1876, p. 257" he recognizes the identity of his *Serranichthys* with *Cromileptes* Swainson. The quotation of Bleeker himself in his Atlas ichthyologique VII, 1873—76 p. 29, repeated by Boulenger, is therefore erroneous.

stronger; vomer with a similar broad band, a very slender band on palatines; tongue smooth. The single dorsal with ten spines gradually increasing in size, lower than the rounded soft portion which has 10 rays; both portions nearly equal in length. Anal with three moderate spines, increasing in size and with ten rays. Caudal rounded, with 14–15 branched rays. Vertical fins with the base of the membrane scaly. Pectorals rounded, with 18 rays; ventrals below their base, close together, with a strong spine. „Posterior processes of praemaxillaries long, the frontal notched anteriorly for their reception; supraoccipital and parietal bones not extending forwards to between postfrontal processes, with the crests moderately strong and somewhat produced on the frontal bones. Vertebrae 24 (10 + 14) [Boulenger]."

Distribution: that of the single species known.

1. **Cromileptes altivelis** (C. V.) [Fig. 10, p. 84].

Serranus altivelis Cuvier & Valenciennes, Hist. nat. Poissons II. 1828, p. 324.
Cromileptes altivelis Swainson, Nat. Hist. Fishes II. 1839, p. 201.
Serranus altivelis Bleeker, Bijdr. Percoïden, Verh. Batav. Gen. XXII. 1849, p. 33.
Serranus altivelis Cantor, Cat. Malayan Fish. Journ. Asiat. Soc. Bengal XVIII. 1850, p. 992.
Serranichthys altivelis Bleeker, Nat. Tijdschr. Ned. Indië VIII, 1855, p. 344. — Enumeratio pisc. Acta Soc. Sc. Indo-neerl. VI. 1859. p. 15. — o. c. VIII. 1860, p. 24. — Versl. Akad. Amsterdam XII. 1861, p. 45, p. 70. — o. c. XIV. 1862, p. 106.
Serranichthys altivelis Kner, Denkschr. Akad. Wien XXIV. 1865, p. 1.
Cromileptes altivelis Bleeker, Atl. ichth. VII. 1873—1876, p. 30.
Cromileptes altivelis Day, Fish. of India 4⁰ 1878—1888, p. 9 (not Supplement 1888, p. 779). — Fauna Brit. India Fishes I. 1889, p. 441 (not synon.).
Cromileptes altivelis Boulenger, Cat. Percif. Fish. I. 1895, p. 271.
Cromileptes altivelis Jordan & Seale, Bull. Bur. fisheries XXVI. (1906) 1907, p. 19.
Cromileptes altivelis Fowler & Bean, Proc. U. S. Nat. Mus. 62, 1922, p. 29.

D. X. 18—19; A. III. 10; L.l. about 70; L. tr. $\pm \frac{20}{53}$.

Height 2.6—3 in length, 3.3—3.8 in length with caudal; it increases with age. Head about thrice in length, to 4 in length with caudal; its upper profile concave, the concavity increasing with age. Eyes 5—6 in head; their distance half or somewhat more their diameter. Upper jaw reaches posterior border of eye or nearly so. Dorsal spines gradually increasing in size, the last has half length of head or somewhat more and about $^3/_4$ the length of the longest soft rays, which in large specimens are about $^2/_3$ of the height of the body. Anal much shorter than soft dorsal, but their height about equal, obtusely rounded; its spines increasing in size, the third, nearly twice length of eye. Pectorals rounded, not much shorter than eye, ventrals with a strong spine, reaching anus, which is situated at some distance before anal. Colour pale reddish-brown, all over covered with round blackish spots, the largest on back smaller than size of eye; larger and less numerous in the young. Length 380 mm. [1]).

Nom. indig.: Kerapo-tikus (Malay. Batavia).

Habitat: Singapore; Pinang; Bintang; Java (Batavia, Bantam); Duizend Islands; Celebes (Macassar, Badjoa); Batjan; Ambon; Gisser!; Kei Islands (Elat)!. — Seas of India, Philippines, Chinese Sea, Australia (Port Essington, Darnley Island). — In sea.

4. Subfam. CENTROGENYSINAE.

Oblong, compressed, covered with rather large, strongly ciliated scales. Lateral line complete, the sensory tubes with an ascending tubule, extending to the extremity of the scale. Head obtuse, convex, totally scaly, only maxillary naked [2]). Anterior nostril with a fringed tentacle. Mouth large, protractile; maxillary exposed, with supplemental bone; jaws equal. Praeoperculum denticulated, with three to four antrorse spines at lower limb, operculum with a strong spine. Gillmembranes separate; seven branchiostegals; pseudobranchiae present; gill-rakers very short; lower pharyngeals united into a triangular bone, but separated by suture. Teeth minute, on jaws in villiform bands, on vomer in a $\wedge$ formed band, on palatines in a slender row, tongue smooth. A single dorsal, its spinous portion with thirteen to fourteen spines, much longer than the soft portion with nine to eleven rays and scaly at its base. The short anal with three spines and five rays, also scaly at its base. Pectorals obtusely rounded with thirteen or fourteen rays; ventrals inserted behind base of pectorals, with a strong spine. Caudal slightly rounded with 12 divided rays. Parietals and supraoccipitals with feeble, not serrated crests; posterior processes of intermaxillaries reaching frontals; vertebrae 25 (11 + 14).

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[1]) Bleeker gives as maximal length 530 mm. but we suppose that this is a misprint.

[2]) According to Boulenger also the mandible is naked, this is not the case in the specimens we have seen.

1. Centrogenys Richardson.

(Richardson, Contribut. Ichth. Australia, Ann. & Mag. Nat. Hist. IX. 1842, p. 120).

Centropristes spec. Cuvier & Valenciennes, Hist. nat. Poissons III. 1829, p. 36.

Myriodon Brisout de Barneville, Revue Zool. 1847, p. 133.

Gennadius Jordan & Seale, Bull. Bureau fisher. XXVI. (1906) 1907, p. 37.

Rhabdosebastes Fowler & Bean, U. S. Nat. Mus. LXII, 1922, p. 60.

For characters of the single genus see those of the subfamily.

Distribution: that of the single species known.

1. Centrogenys vaigiensis (Quoy & Gaim.) [Fig. 11, p. 87].

Scorpaena vaigiensis Quoy & Gaimard in Freycinet, Voy. Uranie & Physic. Zoologie 1824, p. 324.

Centropristes scorpaenoides Cuvier & Valenciennes, Hist. nat. Poissons III. 1829, p. 48.

Centropristes scorpenoides Richardson, Ann. & Mag. Nat. Hist. IX. 1842, p. 121.

Myriodon scorpenoides Brisout de Barneville, Rev. Zool. 1847, p. 130.

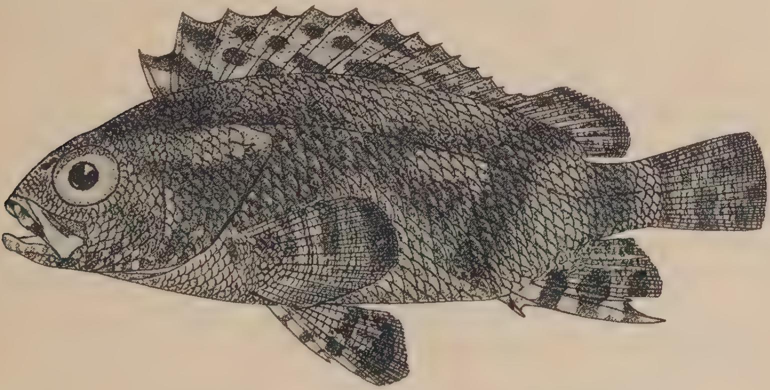

Fig. 11. *Centrogenys vaigiensis* (Q. & G.) $^3/_4$ nat. size.

Myriodon scorpaenoides Bleeker, Nat. Tijdschr. Ned. Indië II. 1851, p. 480.

Myriodon waigiensis Günther, Cat. Brit. Mus. I. 1859, p. 147.

Myriodon waigiensis Kner, Novara-Exp. Fische 1865—1867, p. 38.

Myriodon waigiensis Bleeker, Verh. Akad. Amsterdam XIV. (1873) 1874, p. 122.

Sebastes stoliczkae Day, Fishes India 1878—88, p. 148 (corrected in Addenda & Corrigenda to *Myriodon waigiensis*).

Centrogenys waigiensis Bleeker, Atl. ichth. VII. 1873—1876, p. 68.
Centrogenys waigiensis Boulenger, Cat. Percif. fish. I. 1895, p. 147.
Gennadius stoliczae (sic) Jordan & Seale, Bull. Bur. Fish. XXVI. (1906) 1907, p. 37.
Rhabdosebastes stoliczkae Fowler & Bean, U. S. Nat. Mus. LXII, 1922, p. 60.
Centrogenys vaigiensis Fowler, Fish. Oceania, Mem. Bishop Mus. X, 1928, p. 172.

D. XIII—XIV. 9—11; A. III. 5; L.l. 40—42; L. tr. $\frac{4-5}{14-16}$.

Depth, slightly less than length of head, 2.5 to 3 in length, 3.2 to 3.6 in length with caudal. Eye thrice in head, about twice the convex interorbital space and twice or less the length of the snout. Upper jaw reaching to hinder half of eye. Praeoperculum with 9 to 12, operculum with 7 to 8 transverse series of scales. About 40 scales between superior corner of branchial opening and base of caudal. Dorsal beginning on nape, its spines heteracanth, strong, the third, fourth and fifth longest, equalling about half length of head and surpassing length of the longest soft rays; first and last spines only half as long. Spinous portion more than twice to thrice longer than the obtusely rounded soft portion. Second anal spine much the strongest, not much shorter than head. Pectorals and ventrals nearly of equal length, surpassing postocular length of head; ventral spine strong, somewhat longer than diameter of eye. Colour brown above, paler below, marbled with darker brown; dorsal with oblique series of dark longitudinal spots, partly united to short stripes; other fins with alternating whitish and darkbrown stripes. For other characters compare the description of the genus. Length 150 mm.

Habitat: Singapore; Bangka; Biliton; Bintang (Riou); Java (Batavia); Bawean; Borneo (Sandakan); Celebes (Makassar!, Badjoa, Menado); Saleyer!; Timor; Ambon; Aru Islands (Dobo)!; Waigeu; Rawak; New Guinea; Arafura Sea. — Nicobars, Malacca, Philippines (Panay), Cebu, Riu Kiu, Thursday Island, Australia (Meermaidsstreet, Port Essington, Port Darwin, North West Australia). — In sea.

5. Subfam. SERRANINAE.

Body oblong, more or less compressed, covered by moderate or small denticulated or ciliated scales; lateral line complete, not running close to dorsal profile, sensory tubes straight, covering most of the length of the scale, or with an ascending tubule. Head partly scaled, with naked snout. Praeopercle serrated, the lower border smooth or with antrorse teeth; opercle with one to three spines. Mouth large, protractile, not very oblique, jaws more or less subequal or the lower one prominent. Maxillary large, exposed, naked, without a supplemental bone. Teeth villiform on vomer and palatines, on jaws usually intermixed with caninelike teeth, which exceptionally may be depressible. Tongue smooth. Dorsal X, 11—15, spinous and soft portion confluent, generally subequal. Anal III. 6—8, usually III, 7. Caudal with 15 branched rays, truncate or emarginate. Base of vertical fins without a scaly sheath. Pectorals with 15—18 branched rays, rounded, obtusely pointed or asymmetrical. Ventrals I, 5, inserted below or in front of base of pectorals. Seven branchiostegals; gillmembranes separate; pseudobranchiae present; gillrakers usually slender and more or less elongate, or short and wide apart. Posterior processes of intermaxillaries not extending to the frontals. Supraoccipital and parietal crests not produced on the frontals. Vertebrae 24 (10 + 14).

Distribution: Carnivorous fishes living on the coasts of Europe, Africa, America and Japan; in the indo-australian region represented by a single genus only [1]).

1. **Chelidoperca** Boulenger.

(Boulenger, Cat. Perciform Fish. I, 1895, p. 304).

Body elongate, moderately compressed, covered with moderate, thin, irregularly ciliated scales, wanting on snout and jaws, head otherwise scaly. Lateral line complete, running at some distance below dorsal to middle of caudal peduncle, the sensory tubes with ascending tubule. Mouth large, slightly oblique, protractile, lower jaw projecting; maxillary exposed, without supplemental bone, distally expanded. Opercle with two sharp spines, praeoperculum rounded, serrated, without antrorse spines on the lower border. Bands of villiform teeth in jaws, vomer and palatines; some of the inner ones in the middle of the upper jaw or near mandibulary symphysis depressible and hinged at base; tongue smooth. Seven branchiostegals; gillmembranes separate; pseudobranchiae present, about 12—13 gillrakers of moderate length. Dorsal X 10; spinous and soft portion confluent, subequal in length or the former much longer. Anal III 6. Caudal more or less emarginate. Vertical fins without scales. Pectorals obtusely pointed, with 17 rays. Ventrals anterior to base of pectorals, close together, with a moderate spine. „Posterior processes of intermaxillaries not extending to the frontals; supraoccipital and parietal crests short, smooth area of cranium extending posteriorly to a line connecting the preopercular borders (Boulenger)."

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[1]) It is true, that Bleeker described (Révis. *Epinephelini*, Verh. Akad. Amsterdam XIV. (1873) 1874, p. 7. — Atl. ichth. VII. 1873—1876, p. 22) an other representative of the Serraninae from Java, called by him *Paraserranus hasselti*. But this must be an error. *Paraserranus hasselti* is identical with *Serranus radialis* Q. & G., a fish very well known from both coasts of tropical America. Bleeker founded his description on a single specimen in the Leiden Museum, which was supposed to have been collected by Kuhl & van Hasselt in Java. But this is zoogeographically an impossibility. An other error is more evident. Bleeker records in Verh. Batav. Gen. XXII, 1849, p. 4 (with a query) *Plectropoma ephippium* C. V. from Java. This must be an erroneus determination as *Plectropoma ephippium* C. V. is identical with *Serranus unicolor* (Bl. Schn.), a species only known from the Caribbean Sea and the Gulf of Mexico

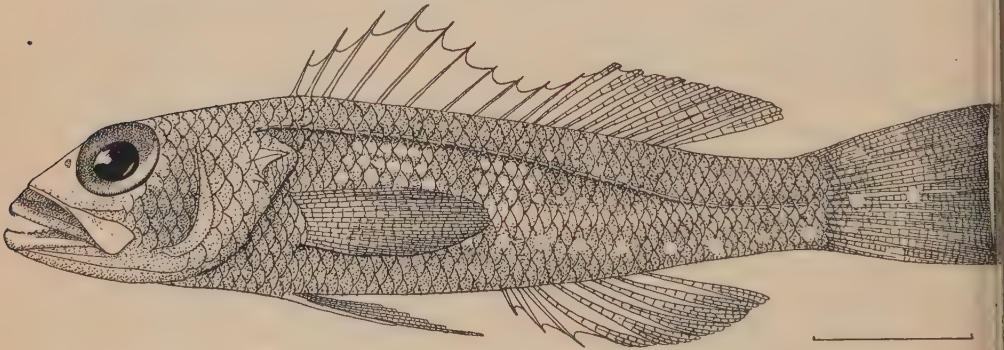

Fig. 12. *Chelidoperca margaritifera* M. Web. After M. Weber.

Distribution: Japan, Sea between Misol and New Guinea, near Kei Islands and Gulf of Bengal; in depths between 118 and 236 M.

Note. The taxonomic position of the genus *Chelidoperca* is not quite clear. According to the presence of caniniform teeth, hinged at the base, on the inner side of the villiform bands of teeth in the jaws, it seems related to the subfamily Epinephelini. But it differs from that subfamily by the absence of a supplemental maxillary, by the wanting of scales on that bone, by the much larger size of the scales, who are not embedded in the skin and other characters. We prefer to place it provisionally in the Serraninae as sole indo-australian representative of that subfamily.

Key to the indo-australian species of Chelidoperca.

1. Spinous and soft dorsal subequal; fourth dorsal spine $^2/_5$ of length of head. L. tr. $\frac{4}{12-14}$. A series of 4 or 5 oblong black spots on sides of body, disappearing in adults. Dorsal with some brown spots 1. *Ch. hirunainacea* p. 91.
2. Spinous dorsal nearly $^1/_3$ longer than soft dorsal; fourth dorsal spine about equal to half length of head. L. tr. $\begin{array}{c}2^1/_2\\ \hline 1\\ \hline 10\end{array}$. A series of twelve pearlcoloured blotches on sides of body. Similar blotches on caudal and above pectorals. Dorsal without spots 2. *Ch. margaritifera* p. 92.

1. **Chelidoperca hirundinacea** (C. V.).

Centropristis hirundinaceus Cuvier & Valenciennes, Hist. Nat. Poissons VII. 1831, p. 450.
Centropristis hirundinaceus Temminck & Schlegel, Fauna japon., Pisces 1844, p. 14.
Centropristis hirundinaceus Günther, Cat. Brit. Mus. I. 1859, p. 87.
Centropristes hirundinaceus Bleeker, Acta Soc. Sc. Indo-neerl. VIII, 1860, Vischf. Japan, p. 75.
Centropristis pleurospilus Günther, Zool. Challenger Exp. VI, 1880, Shore-Fish. p. 37.
Centropristis hirundinaceus Steindachner & Döderlein, Denkschr. Akad. Wien XLVII. 1883, p. 233.
Chelidoperca hirundinacea Boulenger, Cat. Perciform Fish. I. 1895, p. 305.
Chelidoperca hirundinacea Steindachner, „Aurora" Reise, Ann. Hofmuseum Wien XI, 1896, p. 198.
Chelidoperca hirundinacea Jordan & Richardson, Proc. U. S. Nat. Mus. 37, 1910, p. 464.

D. X. 10. A. III. 6. Sc. 45—50 $\frac{4}{12-14}$; L. l. 43—44.

Depth of body 4 to $4^1/_4$ times in total length, length of head $2^2/_3$ to 3 times. Snout as long as or a little shorter than diameter of eye, which is $3^1/_3$ to $3^2/_3$ times in length of head; interorbital region very narrow, $^1/_3$ to $^2/_5$ diameter of eye; lower jaw projecting; maxillary extending to below centre of eye; snout, interorbital region, and jaws naked, cheeks and opercles with large scales; praeopercular rounded, its posterior border evenly serrated; two strong opercular spines. 13 gillrakers on lower part of anterior arch. Dorsal originating above base of pectoral; spines rather feeble, not very unequal, fourth or fifth longest, $^2/_5$ length of head. Pectoral $^2/_3$ to $^3/_4$ length of head. Anal spines feeble, third longest. Caudal with the margin excised, upper rays more or less produced. Rosy, with a yellow lateral stripe; a series of four or five oblong black spots along the side of the body, disappearing in the adult; dorsal fin with some brown spots. Total length 130 millim. The specimen in the Paris Museum measures 175. [After BOULENGER, not seen by us].

Tropical West Pacific Ocean (Japan and Kei Islands).

2. **Chelidoperca margaritifera** M. Web. [Fig. 12, p. 90].

Chelidoperca margaritifera M. Weber, Siboga-Exped. Fische, Leiden 1913, p. 207.
Chelidoperca margaritifera Fowler, Fish. Oceania, Mem. Bishop Mus. X, 1928, p. 184.

D. X. 10; A. III. 6; L.l. 43; L. tr. $\frac{2^1/_2}{\frac{1}{10}}$.

Height of body $4^1/_5$, head 3 in length (without caudal). Profile from snout to dorsal convex, back little elevated; eye somewhat prominent above the slightly concave interorbital space which is $^1/_3$ of the longest, somewhat obliquely directed horizontal diameter of the eye, which goes thrice in the length of the head and is $^1/_3$ longer than snout. Snout, interorbital space and jaws naked, 7 transverse series of scales on cheeks till border of praeoperculum, which has the hindborder coarsely denticulated. Operculum with two divergent spines, the upper one the longest; its hindborder and that of the suboperculum sharply serrated. Lower jaw slightly prominent; maxillary with distal expansion, reaching hindborder of pupil. Bands of fine teeth in jaws, vomer and palatines; caniniform depressible teeth in the neighbourhood of the mandibulary symphysis. About 12 gillrakers, the longest of which do not yet equal the width of the interorbital space. Dorsal originates above base of pectorals; its spines are rather feeble, the fourth is the longest and only $^1/_7$ longer than diameter of eye, spinous portion much longer than the soft-rayed portion. The middle rays of dorsal and anal of similar length. Anal spines feeble, the third the longest. Caudal slightly emarginate. Pectorals somewhat pointed, nearly as long as distance from frontborder of eye to end of upper opercular spine; second ventral ray longer. Colour in alcohol reddish brown with lighter head and fins. An inconspicuous yellowish band from gillopening to base of caudal; below it 12 diffuse pearlcoloured blotches, about the size of a scale, the most anterior run into one another. Similar blotches on caudal and above pectorals, forming ill defined rows. Length of single specimen known 62 mm. [Type in the Museum of Amsterdam seen by us].

Habitat: Between Misol and New Guinea, sandy bottom, 118 M.!

Doubtful species.

We place here as of doubtful occurrence in the Archipelago:

Morone punctata (Bl.).

Sciaena punctata Bloch, Ausl. Fische VI. 1792, p. 64.
Labrax punctatus Günther, Ann. Mag. N. H. (3) XII. 1863, p. 175.
Labrax orientalis Günther, ibidem.
Labrax schoenleinii Peters, Monatsber. Akad. Berlin 1865, p. 95.
Morone punctata Boulenger, Cat. Perc. Fish. I. 1895, p. 131 (vide *synonyma* and description).

Boulenger quotes as habitat of this species: „Atlantic coasts of Europe and Africa, from Normandy to Senegambia; Mediterranean." His quotation omits the interesting fact, that Peters described his *Labrax schoenleinii* from Celebes. While doing so Peters was under the impression of the importance of this occurrence, considering that in his time *Morone* (*Labrax*) was only known from the Atlantic. He amply explains, why he is sure, that his specimen came from Celebes. But in a second paper (Monatsber. 1866, p. 522) he altered his opinion. In the collection of Prof. Schoenlein from Celebes, he found a second atlantic species and so he thinks it possible that also his *L. schoenleinii* was of atlantic origin and mixed with the celebesian collection in a way not more to be controled. But we thought it prudent to insert the species in our list, though otherwise the genus *Morone* and the whole subfamily Moroninae is not known from the indo-australian Archipelago. The nearest representative is *Percalates* Ramsay & Ogilby from Australia.

6. Subfam. ANTHIINAE.

Body oblong, more or less compressed; dorsal profile more convex than the ventral one, covered with adherent, ctenoid or ciliated, smooth scales of large or moderate size. Lateral line complete and continuous, extending to base of caudal, running close to the dorsal or in some genera somewhat reduced and incomplete; the sensory tubes straight or with an ascending tubule, extending along nearly the entire scale. Head without serrated keels, entirely scaly or naked on frontal region; mostly convex in profile, snout short. Mouth rather large, protactile, jaws equal or subequal, their cleft more or less oblique; maxillary exposed, not or only partly slipping below the sheath of the narrow praeorbital; without a supplemental bone. Maxillary usually, often also the mandibulary, with imbricate scales. Praeoperculum serrated, occasionally entire, with or without antrorse teeth or spines on lower border, operculum with two or three spines. Jaws with villiform teeth and strong curved canines or only with a few small ones. Patches of teeth on vomer, palatines, ectopterygoids and tongue, or small groups and narrow bands on vomer and palatines only, the tongue with a few teeth or smooth. Teeth not depressible. A single dorsal, with ix—xii spines and 9—20 branched rays; spinous portion equal to or somewhat shorter or longer than soft-rayed portion. Anal iii, 7—10. Both fins without a scaly sheath at base, but there may be scales between rays at base or the fins may entirely be scaled [1]). Caudal with 15 principal rays, 13 of which are branched, truncate, with the outer lobes produced, or emarginate or deeply forked, the lobes elongated. Pectorals with 14—20, usually branched rays; obtusely pointed, the lower middle rays the longest, or subsymmetrical. Ventrals somewhat before or behind axil of pectorals, close together, with a strong spine and 5 rays; no axillary scale. Branchiostegals 6—7; gillmembranes separate, free from isthmus; gills $3^1/_2$—4, with a slit behind; gillrakers very long and slender or short; pseudobranchiae present. Supraoccipital crest strong or moderate,

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1) Structure of dorsal and anal fin modified in the aberrant genera *Callanthias* Lowe and *Sphenanthias* M. Web.

not produced on frontals; supraoccipitals and parietals extending to between orbits; frontals very convex behind, smooth or with a transverse ridge between posterior borders of orbit in front of supraoccipital crest. Intermaxillary processes not reaching frontals or extending to between them, embracing a deep fossa. Vertebrae 25—26 (10 + 15 + 16).

Distribution: Marine, carnivorous fishes of medium or large size of tropical seas, prefering deep waters; remarkable by their generally red and often brilliant colours.

Key to the indo-australian genera of Anthiinae.

I. Lateral line complete, extending on middle of tail to caudal. Pectoral rays branched.
  1. A large patch of teeth on tongue. Head entirely scaly, including maxillary. Gillrakers long and slender.
    a. Entopterygoids toothed. D. X. 15—17 . . . 1. *Holanthias* p. 96.
    b. No entopterygoid teeth. D. X. 13. . . . . 2. *Odontanthias* p. 97.
  2. Tongue toothless or with few teeth.
    a. Head partly or entirely scaly; maxillary scaly; lower border of praeoperculum without antrorse spines; gillrakers long and slender. D. X. 14—18 . . . . 3. *Anthias* p. 99.
    b. Head partly scaly; maxillary naked; lower border of praeoperculum with 2 antrorse spines; gillrakers short. D. X, 16—17 . . . . . . 4. *Plectranthias* p. 107.

II. Lateral line more or less incomplete, only vestigial on the caudal peduncle or lost on its upper surface. Pectoral rays not divided.
  1. Dorsal fin undivided, X. 17; P. 18; lateral line vestigial on caudal peduncle . . . . 5. *Dactylanthias* p. 109.
  2. Spinous and soft dorsal connected at base only. Lateral line ending below or before end of soft dorsal.
    a. Lower border of praeoperculum with 2 antrorse spines; maxillary naked; D. X. 13; P. 11. . 6. *Pteranthias* p. 111.
    b. Lower border of praeoperculum without antrorse spines; maxillary scaly; D. X. 14—15; P. 14 . . . . 7. *Xenanthias* p. 113.

Aberrant genus:
  Lateral line terminating below soft dorsal. Single dorsal X. 15, the 5 anterior rays simple. P. with 18 divided rays. Jaws naked, with one series of styliform teeth, none on vomer, palatines and tongue. Operculum and praeoperculum entire . . . . . 8. *Sphenanthias* p. 114.

1. **Holanthias** Günther.

(Günther, Proc. Zool. Soc. London 1868, p. 226).
Odontanthias Bleeker, Nederl. Tijdschr. Dierk. IV. (1872) 1873, p. 236 (p. parte).
Ocyanthias Jordan & Evermann, Fishes of North and Middle America 1896, I. p. 1227 (p. parte).

Body strongly compressed; scales moderate or rather large, ciliated, smooth. Lateral line complete, the tube straight or with an ascending tubule, and extending along nearly the entire scale. Mouth rather large, protractile; maxillary exposed; jaws with villiform teeth and curved canines; elongate patches of teeth on vomer, palatines, entopterygoids, and tongue; head entirely scaly, maxillary and mandible included; praeopercle serrated, without antrorse teeth on the lower border; opercle with three spines. Gill-membranes separate; seven branchiostegals; pseudobranchiae present. Gill-rakers very long and slender. A single dorsal fin, with X 15—17 rays, the spinous portion as long as or a little longer than the soft. Anal short, with III 6—7 rays. Caudal entire or emarginate. Pectorals obtusely pointed, aymmetrical, the lower middle rays longest; rays 17—20. Ventrals below pectorals, close together, with a strong spine. Posterior processes of praemaxillaries not reaching frontals, which are very convex behind; parietal and supraoccipital bones extending to between the orbits; supraoccipital crest strong, not produced on the frontals. Vertebrae 26 (10 + 16). [After BOULENGER].

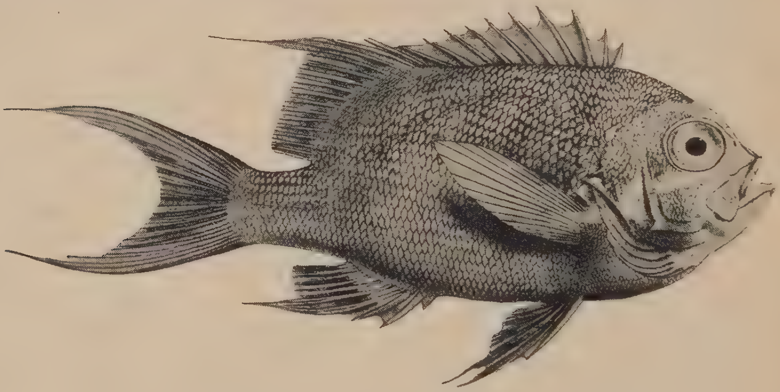

Fig. 13. *Holanthias chrysostictus* (Gthr.) After Günther.

Tropical Atlantic and Indian Oceans.

1. **Holanthias chrysostictus** (Gthr.). [Fig. 13, p. 96].

Anthias chrysostictus Günther, Zool. Soc. London 1871, p. 655.
Odontanthias chrysostictus Bleeker, Nederl. Tijdschr. Dierk. IV. (1872) 1873, p. 237. — Atl. ichth. VII. 1873—1876, p. 21.
Holanthias chrysostictus Boulenger, Cat. Percif. fishes I. 1895, p. 319.

D. X. 15—16; A. III. 7; Sc. $47—48\frac{2}{20}$; l.l. 37—39.

Depth of body $2^1/_4$ times in total length, length of head 3 times. Snout very short, half diameter of eye, which is $2^2/_3$ to 3 times in length of head, and a little exceeds interorbital width; lower jaw projecting; maxillary extending to below centre of eye, the width of its distal extremity half diameter of eye; a strong spine at angle of praeopercle; sub- and interopercle serrated; middle opercular spine strong. 27 gill-rakers on lower part of anterior arch. Dorsal originating above posttemporal; spines increasing in length to the fourth, rest equal; soft dorsal scaly at base, anterior rays longest, third produced in a long filament; no notch between spinous and soft portions. Pectoral as long as head, as long as ventral; latter reaching origin of anal. Anal spines strong, first short, second and third equal and as long as fourth dorsal spine; first and second soft rays produced. Caudal crescentic, with the outer rays much produced. Lateral line forming an angle below last dorsal rays. Rose-coloured, each scale with a bright yellow centre; upper part of head yellow, with a pink spot between the nostrils; an oblique bright yellow stripe from below the eye to the base of the pectoral; soft dorsal yellow, with oblique violet stripes; caudal yellow, with the upper and lower margins and the central rays pinkish violet. Total length 180 mm. [After BOULENGER, not seen by us].

Habitat: Celebes (Menado).

2. **Odontanthias** Bleeker (p.p.).

(Bleeker, Nederl. Tijdschr. Dierk. IV. (1872) 1873, p. 236. — Atl. ichth. VII. 1873—1876, p. 20. — Arch. néerl. XI. 1876, p. 252).

Body strongly compressed; scales rather large, ciliated, smooth. Lateral line complete, the tube straight, and extending along nearly the entire scale. Mouth rather large, protractile; maxillary exposed; jaws with villiform teeth and curved canines; large, elongate patches of teeth on vomer, palatine, and tongue; head scaly, including the maxillary; praeopercle serrated, without antrorse teeth on the lower border; opercle with three spines. Gill-membranes separate; seven branchiostegals; pseudobranchiae present. Gill-rakers very long and slender. A single dorsal fin, with x, 13 rays, the spinous portion a little longer than the soft. Anal short, with iii, 7 rays. Caudal emarginate. Pectoral obtuse-pointed, subsymmetrical; rays 17. Ventrals below pectorals, close together, with a strong spine. [After BOULENGER].

Distribution: Sea of Celebes.

1. **Odontanthias rhodopeplus** (Gthr.). [Fig. 14, p. 98].

Anthias rhodopeplus Günther, Proc. Zool. Soc. London 1871, p. 654.
Odontanthias rhodopeplus Bleeker, Nederl. Tijdschr. Dierk. IV. (1872) 1873, p. 236 — Atl. ichth. VII. 1873—1876, p. 21.
Odontanthias rhodopeplus Boulenger, Cat. Percif. Fishes I, 1895, p. 320.

D. X. 13; A. III. 7; Sc. $45\frac{2}{17}$; l.l. 30.

Depth of body $2^1/_2$ times in total length, length of head $2^2/_3$ times. Diameter of eye twice length of snout, a little more than interorbital width, and one third length of head; lower jaw projecting; maxillary extending to below posterior fourth of eye, the width of its distal extremity $^3/_5$ diameter of eye; one or two strong spines at angle of praeopercle;

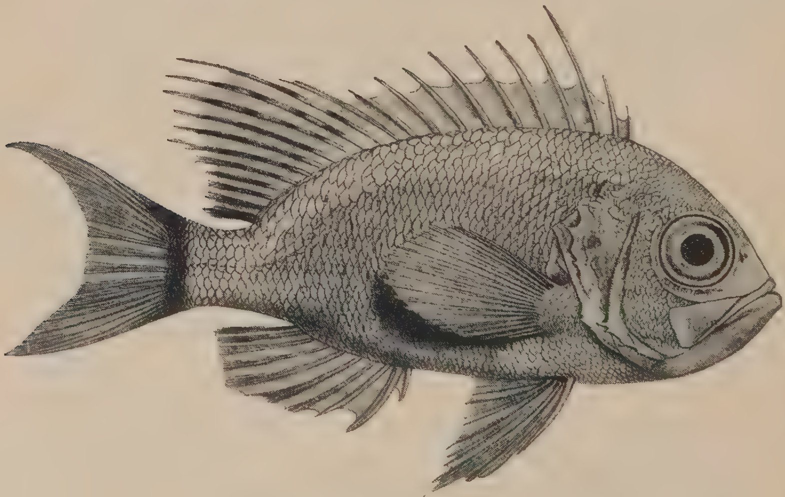

Fig. 14. *Odontanthias rhodopeplus* (Gthr.). After Günther.

middle opercular spine strong. 30 gill-rakers on lower part of anterior arch. Dorsal originating above post-temporal; first spine short, second half as long as third, which is a little longer than the following, and ends in a short filament; second to sixth soft rays long, much longer than dorsal spines, posterior short; no notch between spinous and soft portions. Pectoral a little shorter than head. Ventral as long as head, reaching a little beyond origin of anal. Anal spines strong, first short, second and third equal, as long as last dorsal spine; soft portion rounded. Caudal crescentic. Lateral line forming an angle below last dorsal rays. Rose-coloured on the sides; an oblique yellow stripe from below the eye to the belly; back and caudal peduncle golden yellow; back of tail pinkish violet; base of caudal blackish brown; fins reddish-rose-coloured, the soft dorsal rays barred with brown. Total length 155 mm. [After BOULENGER, not seen by us].

Habitat: Celebes (Menado).

3. **Anthias** Bloch.

(Bloch, Ausländ. Fische VI. 1792, p. 97).
Aylopon Rafinesque, Carattere di Alcuni Nuovi Generi Anim. Sicil. 1810, p. 52.
Pseudanthias Bleeker, Ned. Tijdschr. Dierk. IV. 1873, p. 94. — Atl. ichth. VII, 1873—1876, p. 16.

Body oblong, strongly compressed, covered with smooth, moderate or rather large ciliated scales; lateral line complete

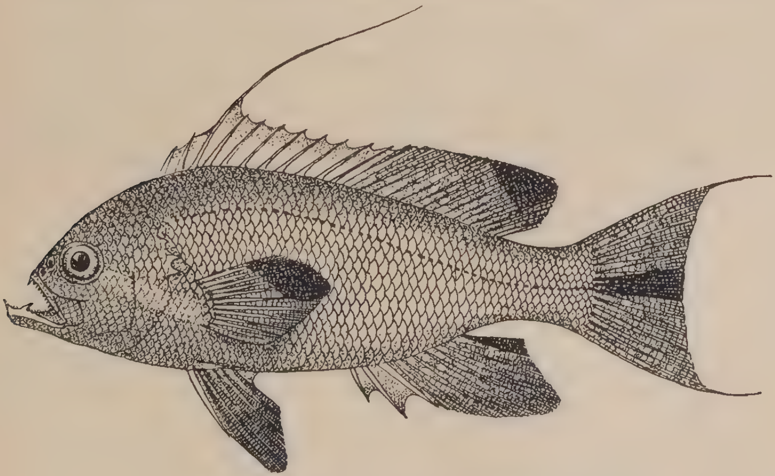

Fig. 15. *Anthias squamipinnis* (Peters). After Bleeker.

running near dorsal, forming an angle or curve below hinder dorsal rays; its sensory tubes straight or with an ascending tubule and extending along nearly the entire scale. Head partly or entirely scaled. Mouth large, protractile; maxillary without supplemental bone, exposed, scaly. Praeoperculum serrated, the teeth near the angle enlarged, without antrorse spines on the lower border; operculum with two or three spines. Gillmembranes separate; seven branchiostegals; pseudobranchiae present; gillrakers very long and slender. Jaws with bands of villiform teeth of different extension and differently intermixed with straight or curved canines. Vomerine teeth in a triangular or rounded group, those on palatines in a slender band; none or only few on tongue. The single dorsal with ten spines and fourteen to eighteen rays. Anal short with three spines and six to eight rays. Caudal emarginate, usually with filamentous lobes. Pectorals subsymmetrical, with seventeen to eighteen divided rays; ventrals below pectorals, close together, with a strong spine. Fins more or less covered by scales; some of the spines and rays may be produced.

Distribution: Inhabitants of tropical and temperate seas.

Key to the indo-australian species of Anthias.

I. Interorbital space a little more or less than diameter of eye.

A. 4—$4^1/_2$ scales between middle dorsal spines and L. l. Scales without squamulae at their base. Height 2.4—2.5.

1. D. X. 16. Third dorsal spine not produced 1. *A. hypselosoma* p. 101.
2. D. X. 17. Third dorsal spine produced . . 2. *A. pleurotaenia* p. 101.

B. 3—4 scales between middle dorsal spines and L. l. Scales with squamulae at their base. Third dorsal spine sometimes produced. D. X. 17. Height 2.5 . . . . 3. *A. huchti* p. 103.

C. 2—3 scales between middle dorsal spines and L. l. Scales with squamulae at their base. Third dorsal spine produced. Height 2.7—3 . . . 4. *A. squamipinnis* p. 104.

D. 2—3 scales between middle dorsal spines and L. l. Scales without squamulae at their base. Third dorsal spine not produced.

1. D. X. 16. Height somewhat more than 3. 5. *A. cichlops* p. 105.
2. D. X. 17. Height 2.7. . . . . 6. *A. manadensis* p. 106.

II. Interorbital space equal to nearly two diameters of eye. 4 scales between middle dorsal spines and L. l. Third dorsal spine produced. D. X. 17 . . 7. *A. mortoni* p. 107.

1. Anthias hypselosoma (Blkr.).

? *Anthias hechti* Günther, in Brenchley's Cruise of the „Curaçao" 1873, p. 410 (nec *huchti* Bleeker).

Pseudanthias hypselosoma Bleeker, Arch. Néerl. Sc. nat. XIII. 1878, p. 58. — Abh. naturw. Ver. Hamburg VII. 1880, p. 29.

Anthias cichlops Douglas Ogilby, Proc. Zool. Soc. London 1889, p. 151 (nec Blkr.).

Anthias hypselosoma Boulenger, Cat. Brit. Mus. I. 2nd. ed. 1895, p. 330.

Pseudanthias hypselosoma Waite, Rec. Austr. Mus. v. 1904, p. 204.

Anthias hypselosoma Fowler, Fish. of Oceania, Mem. Bern. P. Bish. Mus. I. 1928, p. 186.

D. X. 16; A. III. 7; P. 2.15; V. I. 5; L.l. 44—46; L. tr. $\frac{\frac{4}{1}}{14\text{—}17}$.

Height 2.5, 3.3 in length with caudal. Head 3—3.3, nearly 4 in length with caudal. Snout scaly, convex, nearly as long as eye. Eye nearly 4. Interorbital space equal to eye or a little more. Lower jaw slightly projecting, scaly. Maxillary scaly, extending to below centre of eye or a little beyond. Teeth of upper jaw pluriserial, those of outer row larger and with a curved canine in front, those of inner rows very small and with a small canine in front. Teeth of lower jaw pluriserial, those of outer row conspicuously larger. A moderate canine in the middle of each ramus and a strong one near symphysis. Vomerine teeth in a triangular patch, concave at its posterior margin, palatine teeth in a narrow band. Praeoperculum serrated behind and at angle, which is rounded and where the serrations are enlarged. Praeopercular limb scaly. Sub- and interoperculum serrated. Operculum with three spines, the middle one the longest. First and second dorsal spines shortest, rest subequal. Anal spines strong, second as long as or slightly shorter than third. Pectorals equal to ventrals, as long as head. Caudal moderately emarginate. Scales, without squamulae. Colour of alcohol specimens uniform; red in front, yellow behind in life; a blunt white streak from below the eye to the base of the pectorals. Length 95 mm.

Habitat: Misool; New Guinea. — Lord Howe Island, Persian Gulf. In sea.

2. Anthias pleurotaenia Blkr.

Anthias manadensis Bleeker, Act. Soc. Sci. Indo-Neerl. I. 1856, p. 74 (errore).

Anthias pleurotaenia Bleeker, l. c. II. 1857, Vischfauna Ambon. p. 34.

Pseudanthias pleurotaenia Bleeker, Ned. Tijdschr. Dierk. IV, 1873, p. 158. — Atl. Ichth. VII. 1873—1876, p. 17.

Anthias (Pseudanthias) taeniatus Klunzinger, Fische des Rothen Meeres I, 1884, p. 9.

Anthias pleurotaenia Douglas Ogilby, Proc. Zool. Soc. London 1889, p. 153.

Anthias pleurotaenia Boulenger, Cat. Brit. Mus. I. 2nd ed. 1895 p. 331.

Anthias pleurotaenia Waite, Rec. Austral. Mus. V. 1903, p. 3.

D. X. 17; A. III. 7; P. 2.14; V. I. 5; L.l. 52; L. tr. $\begin{array}{c}4\frac{1}{2}\\ \hline 1\\ \hline 17-19\end{array}$.

Height 2.4, 3.4 in length with caudal. Head 3.3, 4.6 in length with caudal. Eye 3.3. Snout obtuse, scaly, shorter than eye. Interorbital space about equal to eye. Mouth very oblique. Jaws equal. Maxillary reaching to below middle of eye, its scales larger than those of upper part of snout. Teeth of upper jaw pluriserial, those of outer row larger, conical and curved, with 2 to 4 moderate straight canines in front; the other series of teeth very small and with two small canines in front, directed inwards. Teeth of lower jaw very small, with a strong canine in the middle of the ramus and a small straight canine near symphysis. Vomerine teeth in a triangular patch, those of palatines in a narrow band. Angle of praeoperculum rounded, posterior and lower border finely serrated, the serrations at angle enlarged. Praeopercular limb scaled. Inter- and suboperculum denticulated. Operculum with three spines, the middle one the longest. Dorsal spines moderate, subequal, excepting the third, which is much longer and equal to postorbital part of head and the first one, which is half as long as the last. Membrane of spinous dorsal somewhat emarginate. Soft dorsal rounded, the rays longer than the spines. The membrane between the soft rays scaly. Anal acute, the rays longer than those of soft dorsal. Third anal spine scarcely longer than second and slightly shorter than third dorsal spine. Pectorals nearly as long as head. Ventrals longer, the second soft ray produced. Caudal deeply emarginate the lobes produced. Scales without squamulae. Colour of alcohol specimen reddish brown, with traces of a white band running from axil of pectorals to above base of anal. Fins yellowish. Length 134 mm. [Type of BLEEKER seen by us in the Leiden Museum].

Habitat. Ambon!. — Northeast coast of Australia, Pleasant Island, Red sea?. In sea.

3. **Anthias huchti** Blkr.

Anthias Huchtii Bleeker, Act. Soc. Sci. Indo neerl. II. Vischfauna Ambon 1857, p. 38.

Pseudanthias Huchtii Bleeker, Ned. Tijdschr. Dierk. IV 1873, p. 160. — Atl. Ichth. VII. 1873—1876 p. 17.

Anthias huchtii Boulenger, Cat. Brit. Mus. 2nd ed. 1895, p. 329.

Anthias huchtii Barnard, Ann. S. African Mus. XXI. 1925—1927, p. 463.

D. X. 17; A. III. 7; P. 2.15; V. I. 5; Ll. 40; L. tr. $\begin{array}{c}3-4\\\hline 1\\\hline 15\end{array}$.

Height 2.5, 3.3—3.4 in length with caudal. Head 3.3—3.5, 4.4—4.6 in length with caudal. Eye 3—3.3. Snout scaly, convex, shorter than eye. Interorbital space somewhat more than eye. Lower jaw not projecting, scaly. Mouth oblique. Maxillary scaly, extending to below posterior third of eye. Maxillary scales larger than frontal ones. Teeth in upper jaw pluriserial, the outer row enlarged, curved forwards and with 2 straight canines in front, the teeth of the inner rows very small and with two small curved canines in front. Teeth of lower jaw pluriserial, a strong canine, curved backwards, in the middle of each ramus and a small canine near symphysis. Vomerine teeth in a triangular patch, those of palatines in a narrow band. Praeoperculum denticulated behind and at angle, which is rounded and where the denticulations are enlarged. Lower border of praeoperculum smooth. Praeopercular limb scaly. Sub- and interoperculum serrated. Operculum with three spines, the middle one the longest. Posterior dorsal spines subequal, somewhat shorter than soft dorsal rays. Third dorsal spine longest and sometimes produced. First one more than twice as short as ultimate one. The membrane between the soft dorsal rays scaly. Second anal spine longer and stronger than third. Soft anal rays longer than those of dorsal. Pectorals as long as head, ventrals a little shorter. Caudal crescentic, outer rays produced into short filaments. Scales with squamulae. Colour of alcohol specimens reddish brown, fins yellowish. Indications of a row of black patches on dorsal profile sometimes present as also vestiges of a white band, running from eye to base of pectorals. Length 90 mm. [Typical specimens of BLEEKER's collection in the Leiden Museum seen by us].

Habitat. Ambon!; Flores!. — Coast of Natal.

4. Anthias squamipinnis (Peters). [Fig. 15, p. 99].

Serranus (Anthias) squamipinnis Peters, Monatsber. Akad. Berlin 1855, p. 429.
Anthias cheirospilos Bleeker, Acta Soc. Sc. Indo-Neerl. II. 1857, Vischfauna Amboina, p. 36.
Anthias lepidolepis Bleeker, l. c. p. 37.
Anthias squamipinnis Klunzinger, Abhandl. zool. bot. Ges. Wien XX. 1870, p. 706.
Pseudanthias chirospilus Bleeker, Ned. Tijdschr. Dierk. IV. 1873, p. 161. — Atl. ichth. VII. 1873—1876, p. 18.
Pseudanthias lepidolepis Bleeker, ll. cc. p. 163; p. 19.
Anthias (Pseudanthias) gibbosus Klunzinger, Fische d. Rothen Meeres I. 1884, p. 9.
Anthias (Pseudanthias) squamipinnis Klunzinger, ibid.
Anthias (Pseudanthias) squamipinnis Sauvage, Poissons de Madagascar, 1891, p. 133.
Anthias squamipinnis Boulenger, Cat. Brit. Mus. I, 2nd. ed. 1895, p. 329.
Anthias squamipinnis Barnard, Ann. S. Afric. Mus. XXI. 1925—1927, p. 462.
Anthias squamipinnis Fowler, Fish. of Oceania. Mem. Bern. P. Bish. Mus. X. 1928, p. 183.

D. X. 17; A. III. 7; P. 2.15; V. I. 5; L.l. 40; L. tr. $\begin{array}{c}2\text{—}3\\ \hline 1\\ \hline 14\text{—}17\end{array}$.

Height 2.7—3, 3.7—4 in length with caudal. Head 3.4—3.6, 4.4—4.7 in length with caudal. Eye 3.3—3.5. Snout scaly, convex, shorter than eye. Interorbital space about equal to eye. Mouth oblique, lower jaw projecting, scaly. Maxillary reaching to below posterior half of eye. Maxillary scales larger than the frontal ones. Teeth of upper jaw pluriserial, those of outer row longer, conical, with two moderate straight canines in front; the inner series of teeth very small and with two small curved canines in front. Teeth of lower jaw very small, with a strong canine in the middle of each ramus and one or two small canines near symphysis. Vomerine teeth in a triangular patch, those of palatines in a narrow band. Angle of praeoperculum rounded. Posterior border and angle serrated, the serrations at angle enlarged. Inferior border smooth. Praeopercular limb scaled. Suboperculum and interoperculum denticulated. Operculum with three spines, the middle one the longest. Dorsal spines moderate, the posterior ones subequal, the first half as long as the last, the third longest and prolonged into a filament, which may reach caudal. Membrane of spinous dorsal somewhat emarginate. Soft dorsal forming an obtuse point in its posterior third, the membranes between the rays scaly. Second and third anal spines subequal. Soft anal pointed behind, its rays much longer than those of soft dorsal. Pectorals as long as or a little shorter than head.

Ventrals about as long as pectorals. Caudal emarginate, the outer rays more or less produced into filaments. Scales with squamulae at their base. Colour of alcohol specimens greenish, fins yellowish red. Sometimes with traces of blackish on tip of soft dorsal and on middle caudal rays. In life a light band between eye and base of pectorals. Length 107 mm. [Types of *A. chirospilus* and of *A. lepidolepis* of BLEEKER's collection in the Leiden Museum seen by us].

Habitat: Ambon!; New Guinea. — Coast of Natal, Madagascar, Mossambique, Red Sea.

5. **Anthias cichlops** (Blkr.).

Serranus cichlops Bleeker, Nat. Tijdschr. Ned. Indië IV. 1853, p. 245.
Anthias cichlops Günther, Cat. Brit. Mus. I. 1859, p. 95, p. 503.
Pseudanthias cichlops Bleeker, Ned. Tijdschr. Dierk. IV. 1873, p. 166. — Atl. ichth. VII. 1873—1876, p. 20.
Anthias cichlops Boulenger, Cat. Brit. Mus. I. 2nd. ed. 1895, p. 328.

D. X. 16; A. III. 7; P. 2.17; V. I. 5; L.l. 45; L. tr. $\begin{array}{c}2-3\\ \hline 1\\ \hline 12\end{array}$.

Height somewhat more than 3, 4.3 in length with caudal. Head 3.5, 4.7 in length with caudal. Eye 3.5. Snout scaly, shorter than eye. Interorbital space almost equal to eye. Mouth oblique, lower jaw projecting. Maxillary reaching to below posterior half of eye. Maxillary scales larger than frontal ones. Teeth in upper jaw pluriserial, those of the outer rows larger and conical and with a moderate canine in front, teeth of inner rows small, one or two small canines in front. Teeth of lower jaw small, pluriserial, a canine on the middle of each ramus and a small canine near symphysis. Vomerine teeth in a triangular patch, those of palatines in a narrow band. Angle of praeoperculum rounded. Hindborder and angle serrated, about 4 larger serrations at angle. Lower border smooth. Praeopercular limb scaly. Suboperculum and interoperculum serrated. Three opercular spines, the upper one scarcely visible. Anterior and middle dorsal spines shorter than the posterior ones, which are as long as soft dorsal rays. Soft dorsal obtusely angulate. Membrane between spines of dorsal hardly emarginate, that between soft rays scaly at base. Second anal spine longest, longer than dorsal spines; soft anal pointed. Pectorals about equal to ventrals, nearly as long as head. Caudal slightly emarginate, with the outer rays prolonged. Scales without squamulae. Colour of alcohol specimen greenish, fins yellowish-red. Length 112 mm. [Type of BLEEKER's collection seen by us in the Leiden Museum].

Habitat: Sumatra (Priaman). — Lord Howe Island.

6. **Anthias manadensis** Blkr.

Anthias manadensis Bleeker, Act. Soc. Sci. Indo-Neerl. I. N⁰. 6, 1856, p. 39.
Pseudanthias manadensis Bleeker, Ned. Tijdschr. Dierk. IV. 1873, p. 165. — Atl. ichth. VII. 1873—1876, p. 19.
Anthias manadensis Boulenger, Cat. Brit. Mus. I. 2nd. ed. 1895, p. 329.
Anthias manadensis Barnard. Ann. S. Afric. Mus. XXI. 1925—1927, p. 463.
Anthias manadensis Fowler, Fishes of Oceania, Mem. Bern. P. Bish. Mus. X. 1928, p. 185.

D. X. 17; A. III. 7; P. 2.17; V. I. 5; L.l. 45; L. tr. $\begin{array}{c}2\text{—}3\\ \hline 1\\ \hline 15\text{—}16\end{array}$.

Height 2.7, 3.7 in length with caudal. Head 3.2, 4.3 in length with caudal. Eye 3. Snout obtuse, scaled, shorter than eye. Interorbital space three fourths of eye. Mouth oblique, jaws subequal. Maxillary reaching to below posterior half of eye, its scales larger than those of upper part of snout. Teeth of upper jaw pluriserial, the outer row enlarged, conical and directed backwards, with a single, scarcely curved moderate canine in front; the other series of teeth very small and with a somewhat curved canine in front. Teeth of lower jaw pluriserial, with a large, much curved canine in the middle of the ramus and a small straight canine, somewhat directed outwards, in front. Vomerine teeth in a triangular band, palatine teeth in a narrow band. Angle of praeoperculum rounded, posterior and lower border in its anterior part finely serrated, the serrations at angle enlarged. Praeopercular limb scaled. Interoperculum and suboperculum denticulated. Operculum with 3 spines, the middle one the longest. Dorsal spines moderate, the posterior ones subequal, the third one longest and equal to snout and eye; the first one half as long as the last. Membrane of spinous dorsal much emarginate; that of soft dorsal scaly. Soft dorsal rounded, the rays longer than posterior spines. Anal acute, the rays longer than those of soft dorsal. Middle anal spine the longest, longer and stronger than third dorsal spine. Pectorals nearly as long as head. Ventrals about of the same length. Caudal emarginate, the lobes pointed and produced. Scales without squamulae. Colour of alcohol specimen uniform reddish brown. In life with about 5 pink bands from eye and mouth to caudal.

Length 106 mm. [Type of BLEEKER in the Leiden Museum seen by us].

Habitat: Celebes (Menado!); New Guinea. — Coast of Natal. In sea.

7. **Anthias mortoni** Macleay.

Anthias Mortoni Macleay, Proc. Linn. Soc. N.S. Wales VIII. (1883) 1884, p. 253.

Pseudanthias mortoni Jordan & Seale, Bull. Bureau Fisheries XXV. (1905) 1906, p. 260.

$$\text{D. X. 17; A. III. 8; L.l. 40; L. tr. } \frac{4}{\frac{1}{12}}.$$

Height one fourth of total length, snout shorter than eye. Mouth oblique, small, the maxillary broad and triangular, reaching to below the middle of the eye; the space between the eyes convex, and equal to nearly two diameters of the orbit. The first dorsal spine is small, the second a little longer, the third is produced into a filament, and is thrice the length of the following ones; the second and third anal spines are about equal in length, the third and fourth rays are elongate; the caudal fin is long and forked, with the lobes produced. Colour slate blue, with crimson stripe on gills, and flame colour fins and tail, the latter has a light edge. [After MACLEAY, not seen by us].

Nom. indig.: Maru-watti-kerara.

Habitat: New Guinea (Moresby Island).

4. **Plectranthias** Bleeker.

(Bleeker, Nederl. Tijdschr. Dierk. IV. (1872) 1873, p. 238. — Atl. ichth. VII. 1873—1876, p. 21 — Boulenger, Cat. Percif. Fishes I. 1895, p. 331).

Body strongly compressed; scales large, ciliated, smooth. Lateral line complete, the tube produced into an ascending tubule. Mouth rather large, protractile; maxillary exposed; jaws with villiform teeth and curved canines; a small group of teeth on the vomer and a narrow series on each palatine; tongue smooth; head partly scaly; posterior border of praeopercle serrated, lower border with two strong antrorse spines; opercle with three spines. Gill-membranes separate; seven branchiostegals; pseudobranchiae present; gill-rakers short. A single dorsal fin, with X. 16—17 rays, the spinous portion a little longer than the soft. Anal short, with III, 7 rays. Caudal truncate. Pectorals obtuse-pointed, subsymmetrical; rays 14–15. Ventrals below pectorals, close together, with a strong spine.

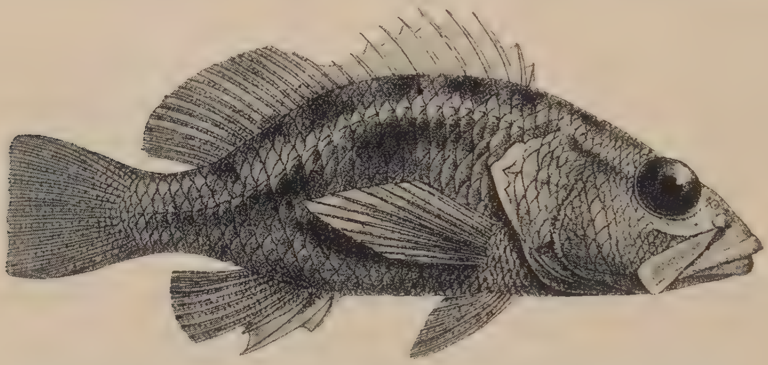

Fig. 16. *Plectranthias anthioides* (Gthr.). After Günther.

Posterior processes of praemaxillaries extending to the frontals, which, however, do not embrace a fossa; parietal and supraoccipital bones very short, with moderate crests, the frontals behind the orbits smooth and convex. Vertebrae 26 (10 + 16).

Western Tropical Pacific. [After BOULENGER].

1. **Plectranthias anthioides** (Gthr.) [Fig. 16, p. 108].

Plectropoma anthioides Günther, Proc. Zool. Soc. London 1871, p. 655.
Plectropoma anthioides Bleeker, Ned. Tijdschr. Dierk. IV. 1873, p. 237.
Plectranthias anthioides Bleeker, Atl. ichth. VII. 1873—1876, p. 21.
Anthias megalepis Günther, Challenger Rep., Shore-Fishes 1880, p. 37.
Plectranthias anthioides Boulenger, Cat. Percif. Fishes I. 1895, p. 332.

D. X. 16—17; A. III. 7; Sc. 32—37 $\frac{2-3}{13-15}$; L.l. 28—33.

Depth of body $2^2/_3$ to 3 times in total length, length of head $2^1/_2$ to $2^2/_3$ times. Snout naked, as long as or slightly shorter than the eye, the diameter of which is $3^2/_3$ to 4 times in length of head; interorbital region scaly, narrow, not half diameter of eye; lower jaw not or but slightly projecting; maxillary naked, extending to below posterior third or posterior border of eye; praeopercular border rounded; opercular spines strong. 11 or 12 gill-rakers on lower part of anterior arch. Dorsal originating above base of pectoral; third or fourth spine longest, $^3/_5$ to $^1/_2$ length of head, and about as long as soft rays; a deep notch between spinous and soft portions. Pectoral a little shorter than head and much longer than ventral. Anal spines strong, first short, second longest, as long as or a little longer than longest dorsal. Caudal truncate. Lateral line forming an angle on caudal peduncle. Rose-coloured, uniform or with irregular blackish patches on the back. Total length 100 mm. [After BOULENGER, not seen by us].

Sea of Celebes (Menado) and Arafura Sea (Kei islands).

5. **Dactylanthias** Bleeker.

(Bleeker, Nederl. Tijdschr. Dierk. IV. 1873, p. 94, p. 156 — Atl. ichth. VII. 1873—1876, p. 15 — Boulenger, Cat. Percif. Fishes I. 1895, p. 333.

Oblong compressed, with rather large, smooth ciliated scales covering the entire head; lateral line complete, strongly curved, the sensory tubes occupying the total length of the scale or nearly so. Mouth rather large, oblique; lower jaw the longer, naked. Maxillary exposed, without supplemental bone, reaching below eye, covered with imbricate scales about equal to the antorbital ones. Praeoperculum and operculum with larger scales, about 6 in a longitudinal series. The former rounded, its hindborder serrate, the teeth near the angle

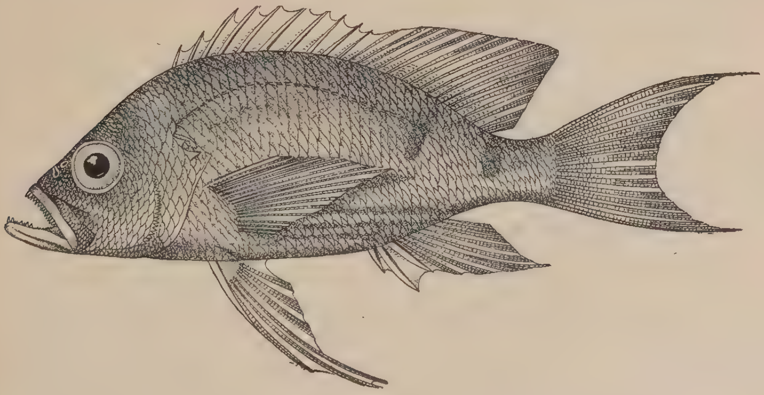

Fig. 17. *Dactylanthias haplodactylus* Blkr. After Bleeker.

larger, lower limb without spines; operculum with three spines, the middle one the largest. Pluriseriate teeth in jaws, in the upper one an outer series of larger unequal, conical, curved teeth, directed forward, in front two moderate curved canines, the inner series very short, with two similar canines in front; in the lower jaw slender teeth, longer than those of the inner series, in front with 2 or one, in the middle with 3 to 4 unequal canines; vomer with a triangular patch, palatines with an oblong, elongate band of teeth; tongue smooth. Dorsal continuous with ten strong spines, the middle ones somewhat longer than the others, soft portion acute with 17 branched rays, anal short with three spines and 7 branched rays forming an acute fin. Caudal deeply emarginate with 13 branched rays. Base of vertical fins with scaly membrane between rays and spines. Pectorals acute-elongate, the eighteen rays not branched. Ventrals below pectorals, close together, with a strong spine and 5 branched rays, the second and third of which are elongate. Seven branchiostegals, gillmembranes separate; pseudobranchiae present. [After BLEEKER].

Distribution: that of the single species known.

1. **Dactylanthias haplodactylus** Blkr. [Fig. 17, p. 109].

Anthias aplodactylus Bleeker, Acta Soc. Sc. Indo-neerl. III. 1858; Negende Bijdrage Vischfauna Amboina, p. 3.

Dactylanthias aplodactylus Bleeker, Ned. Tijdschr. Dierk. IV. 1873, p. 168 — Atl. ichth. VII. 1873—1876, p. 15.

Dactylanthias haplodactylus Boulenger, Cat. Percif. Fishes I. 1895, p. 333.

D. X. 17; A. III. 8; P. 18; V. I. 5; L.l. 40; L. tr. $\frac{2-3}{16-17}$.

Depth about $2^{3}/_{5}$ in length, $3^{2}/_{3}$ in length with caudal; head about $2^{5}/_{6}$ in length, somewhat more than 4 in length with caudal. Eye. about $3^{1}/_{2}$ in head, $^{2}/_{3}$ of its diameter equal to interorbital space. Upper jaw somewhat more than twice in length of head, reaching to middle of eye. Origin of dorsal above upper corner of branchial opening, the middle one of the 10 strong spines the longest, equalling about $^{1}/_{3}$ of the height of the body, the first and second the shortest; the membrane deeply incised, its base scaly; soft dorsal pointed, the longest rays about $1^{1}/_{2}$ in height of body. Anal pointed, equalling the height of soft dorsal, third ray produced. Caudal emarginate, with the outer branched rays produced. Pectorals pointed; ventrals close together, inserted below base of pectorals, with a strong spine, pointed with the second and third branched ray strongly produced. Colour in alcohol red, fins yellowish-rose; two purplish-violet transverse bars, the anterior below the middle of the soft dorsal, the posterior nearly surrounds the anterior part of the caudal peduncle; belly with a series of reddish spots arranged in bands. Length of the single specimen known 255 mm. [After BLEEKER not seen by us].

Habitat: Ambon.

6. **Pteranthias** M. Weber.

(M. Weber, Siboga-Expeditie, Fische, Leiden 1913, p. 208).

Body oblong, compressed; the upper profile conspicuously rounded, covered by rather large, smooth, ciliated scales, those of nape and front much smaller, extending to interorbital space; otherwise the scales on head wanting on snout, maxilla and mandibula; on cheeks in 5 oblique rows, present on suboperculum and irregular and large ones on operculum. The lateral line rises strongly curved from upper corner of gillopening to dorsal, separated from it by one series of scales and terminates below anterior third of soft-rayed dorsal; the sensory tubes are simple. Mouth protractile, its cleft slightly oblique. Maxillary exposed, without supplemental bone, strongly broadened behind, extending behind eye. Operculum with 3 equidistant, sharp spines; praeoperculum rounded with 10—12 teeth increasing in size downward, at lower border 2 antrorse spines; interoperculum with 4 oblique teeth. Jaws with a band of villiform teeth, narrowed behind and mixed in front and on sides with curved caninoids, on the sides in the lower jaw a larger curved tooth. Teeth on vomer and palatines arranged in close-set, horse-shoe shaped bands. Six branchiostegals; gillmembranes separate, free from isthmus;

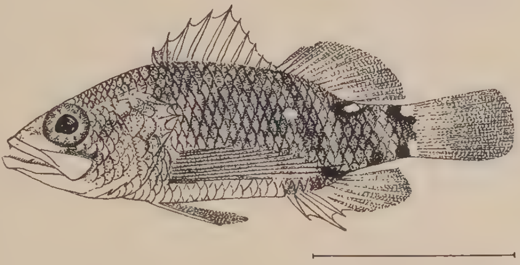

Fig. 18. *Pteranthias longimanus* M. Web.
After M. Weber.

$3^{1}/_{2}$ gills, 6 short gillrakers. Spinous dorsal with x spines, connected at base with soft dorsal with 13 branched rays; anal iii, 5—6; caudal subtruncate; pectorals pointed-elongate; 11 rays all simple; ventrals i, 5 triangular, inserted somewhat before base of pectorals.

Distribution: that of the only known species.

Note: Evidently closely allied to *Xenanthias* Regan. It differs from that genus by the two conspicuous antrorse spines at lower border of the praeoperculum, by the naked maxillary, which has besides an other shape, by the pectorals with only 11 rays; the other differences may have only specific value. As there is only a single species of both genera known, it is perhaps better to maintain provisionally both genera.

1. **Pteranthias longimanus** M. Web. [Fig. 18, p. 111].

Pteranthias longimanus M. Weber, Siboga-Exped. Fische, Leiden 1913, p. 209.

D. X. 13; A. III. 5—6; P. 11; V. I. 5; L.l. 25; L. tr. $\begin{array}{c}1\\ \hline 1\\ \hline 10\end{array}$.

Height of body $2^{3}/_{4}$ in length, $3^{1}/_{2}$ in length with caudal; head $2^{1}/_{4}$, $3^{1}/_{4}$ in length with caudal. Eye $3^{1}/_{3}$ in head, its diameter somewhat longer than pointed snout. Distal expansion of maxillary equals $^{2}/_{3}$ of diameter of eye and reaches hind-border of eye. Lower jaw slightly prominent. Fifth spine of spinous dorsal the longest, nearly half height of body, nineth and tenth spine very short, shorter than first spine. Soft-rayed dorsal rounded, its rays nearly reaching caudal. Anal with the second spine strong and elongate, equalling about fifth dorsal spine, soft anal similar to soft dorsal. Caudal subtruncate. Vertical fins without scales. Pectorals with the rays undivided, the lowest one short, the following 3 to 4 strongly produced reaching to end of base of anal; the subsequent superior rays successively shorter. Ventrals short, not reaching anus. Colour in alcohol yellowish-brown with dark marmoration. At base of caudal and behind last ray of dorsal and anal a dark-brown blotch, immediately followed by a white one; a similar white patch below third dorsal ray in the upper third of the body. Length 31 mm. [Type of the species in the Museum of Amsterdam].

Habitat: Paternoster Islands!; Borneo Bank!; Banda!; Eastern point of Timor! on coral and sandy bottom in 27 to 50 M. depth.

7. **Xenanthias** Regan.

(C. Tate Regan, The Percy Sladen Trust Exp., Trans. Linn. Soc. London XII, 1908, p. 223).

Body compressed; scales large, smooth, ciliated. Lateral line incomplete, ending below the soft dorsal; tube straight, extending nearly the whole length of the exposed part of the scale. Mouth rather large, protractile; no supramaxillary; jaws with villiform teeth and a few small canines; narrow bands of teeth on vomer and palatines; tongue smooth; head scaly, except snout, lower jaw, and lower part of maxillary; praeopercle, subopercle, and interopercle serrated; three opercular spines. Gillmembranes separate; 6 or 7 branchiostegals; pseudobranchiae present; $3^1/_2$ gills. Two dorsals connected at the base with x, 14—15 rays, the spinous dorsal a little longer than the soft. Anal short, with iii, 6—7 rays. Caudal probably subtruncate. Pectoral subsymmetrical, pointed; rays 14, all simple, not branched. Ventrals below pectorals, close together, with i, 5 rays.

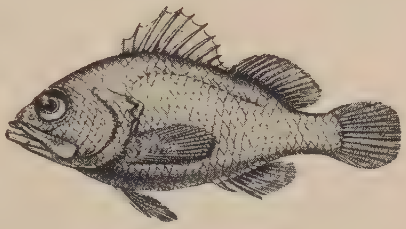

Fig. 19. *Xenanthias gardineri* Regan. After Regan. Slightly more than nat. size.

Evidently closely allied to *Dactylanthias* Blkr., which has the dorsal fin undivided. From Bleeker's figure of *D. haplodactylus* it would appear that the lateral line may be only vestigial on the caudal peduncle in that species. [After C. T. REGAN, not seen by us].

Note. For comparison with *Pteranthias* we have given a place to this genus which is not known from the Archipelago.

1. **Xenanthias gardineri** Regan. [Fig. 19, p. 113].

Xenanthias gardineri C. T. Regan, Trans. Linn. Soc. London XII. 1908, p. 223.

Depth of body $2^1/_3$ to $2^1/_2$ in the length, length of head $2^1/_2$ to $2^2/_3$. Snout a little shorter than eye, the diameter of which is $3^1/_2$ to $3^3/_4$ in the length of head and twice the interorbital width. Lower jaw slightly projecting; maxillary extending beyond the vertical from posterior edge of eye. 5 or 6 gill-rakers and 2 or 3 rudiments on the lower part of the anterior arch. 27 to 30 scales in a longitudinal series, 16 to 20 in the lateral line, which ends below the middle of the soft dorsal. Dorsal x, 14—15; fourth spine usually longest, $^1/_2$ the length of head; soft fin scaly at the base. Anal iii, 6—7; second spine longest. Pectoral nearly $^3/_4$ the length of head, extending to above the origin of anal. Ventral $^3/_5$ the length of head. No marking on head or body; fins pale.

Seychelles group, Amirante, 25 to 35 fathoms.

Five specimens, the largest 48 mm. in total length. [After REGAN, not seen by us].

8. **Sphenanthias** M. Weber.

(M. Weber, Siboga-Expeditie, Fische, Leiden 1913, p. 210).

Body elongate, compressed, covered with large, smooth scales, with crenulated hindborder. The lateral line rises abruptly from upper corner of gillopening to second or third spine of dorsal and runs along its whole base, in shape of small grooves on half scales. Head irregularly scaled, with the dorsal profile only slightly oblique. Operculum and praeoperculum entire, only the lower border of the lastnamed may be somewhat uneven. Mouth with the gape moderate, strongly ascending, protractile; maxillary exposed, without supplemental bone, reaches to below anterior third of eye; the width of its broad distal extremity much more than half diameter of eye. Mandibula included in the strongly ascending intermaxillaries. Eye large. Jaws naked, with one series of small styliform, acutely pointed, curved teeth wanting on mandibulary symphysis, somewhat multiplied and forming 2 or 3 short rows at mandibulary symphysis; vomer, palatines and tongue without teeth. Six branchiostegals; gillmembrânes separate, free from isthmus, pseudobranchiae large; gillrakers numerous, close-set, long and slender. A single dorsal with 9 weak spines and 15

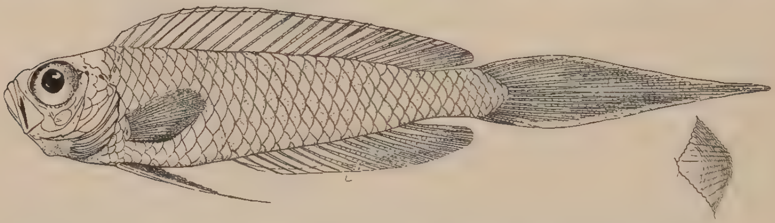

Fig. 20. *Sphenanthias sibogae* M. Web. half natural size. After M. Weber.

branched rays. Anal with a weak spine and 15—16 rays, of which the 5 anterior ones are simple, the others branched or, according to an other interpretation, with 6 spinelike flexible weak rays and 9—10 branched rays. Both fins without scales, implanted in a shallow furrow. Caudal scaly at its base, cuneiform, longpointed, the inner rays gradually elongated. Pectorals short, rounded with 18 divided rays; ventrals below them, their base close together, with a weak spine and 5 rays, 3 of which are branched, the two outer ones strongly produced. No auxiliary scalelike prolongations at paired fins. Posterior process of intermaxillare considerably prolonged. Bones of skull superficially with wide sensory canals.

Distribution: that of the single known species.

Note: One of us (Siboga-Exped. Fische 1913) has already some years ago expressed his opinion about the taxonomic position of *Sphenanthias*. It still remains somewhat doubtful. With *Pseudoplesiops* it has in common the structure of the dorsal and anal fins. Also the ventrals resemble externally in some way those of *Pseudoplesiops*, but they have, besides a weak spine, 4 unbranched rays, the first of which is elongate, incrassate and bifid. Quite different is also the structure of the mouthparts, the dentition, the scales; there are also only about 10 flat gillrakers.

The conformity with *Callanthias* Lowe seems to be much closer. The behaviour of the large ciliated scales, of the lateral line, of the dorsal, of the very oblique mouth, which has the lower jaw included, of the entire praeoperculum, of the numerous slender close-set gillrakers is similar; also the anal spines are rather feeble but there are only three in *Callanthias* and its dentition is different, though also in *Callanthias peloritanus* the teeth in the lower jaw are already reduced, almost to a single row at the sides, becoming a narrow band in front. *Callanthias* is an aberrant form of the Anthiinae with modified dorsal, entire praeoperculum, reduced lateral line with altered direction and extension, and beginning reduction of dentition. In *Sphenanthias*, living in deeper water, these characters are more intensified; others of its external features are also found in the Anthiinae f. i. the ventrals with the outer ray much produced in *Anthias sacer* Bloch and *asperilinguis* Gthr.; the reduction of the lateral line in *Xenanthias* Regan and *Pter-*

anthias M. Web. In our opinion *Sphenanthias* may therefore provisionally find a place in the Anthiinae. This opinion is strengthened by the study of the very accurate and detailed description of *Callanthias* by Lowe.

1. **Sphenanthias sibogae** M. Web. [Fig. 20, p. 114].

Sphenanthias Sibogae M. Weber, Siboga-Exp. Fische, Leiden 1913, p. 211.

Body elongate, gradually tapering, strongly compressed. Profile blunt. Greatest depth equal to length of head, which goes about 4 times in length without caudal, the length of which is nearly $^2/_5$ of total length. Eye about in the middle of the head, its diameter equals about half length of head and twice the length of the snout and the flat interorbital space. Vent situated much nearer to anal than to base of ventrals. Scales vertically oblong, nearly rhombic, with hindborder bluntly toothed, otherwise smooth. Dorsal originates above gillopening; its rays increase slightly in length posteriorly till they equal the length of head without snout and reach the base of caudal. The 9 anterior rays are spinelike but flexible and weak. The anal behaves about in the same manner but its anterior 6 rays may be interpreted as 6 simple ones, followed by 9—10 branched ones or as one flexible, weak spine, followed by 5 simple and 9—10 branched ones. Ventrals with a relatively strong spine followed by a first thickened ray, much longer than head and reaching to fifth or sixth anal ray; the second ray is also produced, but much shorter. Pectorals as long as head without snout; the median rays the longest. About 30 closeset long, slender gillrakers. For other characters see those of the genus. Colour yellowish (in live rose-coloured), the jaws, gillmembranes, abdomen and margin of vertical fins white; a longitudinal, intense black blotch between maxillary and intermaxillary. Length 127 mm. without caudal.

Habitat: Timor Sea, sandy bottom 216 M.!

7. Subfam. PSEUDOCHROMIDINAE.

Body obong, compressed, covered by ctenoid or ciliated scales of medium size, which may be cycloid and small on head, the cheeks included, and large and irregular on opercle. Lateral line usually tubulate, interrupted, its upper part running parallel to dorsal and terminating below it, its lower part recommencing some scales lower down and continued to caudal. Base of vertical fins generally scaly. Jaws subequal or the lower the longest. Mouth not or only slightly protractile; its cleft is large, reaching behind eye or much less far and is then very oblique. Teeth in jaws minute or conical, pluriseriate, the anterior ones enlarged or caniniform, present on vomer and mostly on palatines. Preopercle entire or with a superior flat spine or serrate; opercle unarmed or nearly so. Dorsal long, beginning above base of pectorals; by exception with 7 (or more) pungent spines, the spinous portion of dorsal subequal to the soft-rayed portion; usually only 2 or 3 slender, weak or rather strong, pungent spines and the spinous portion very much shorter than the soft-rayed portion with numerous rays which are branched throughout or only in their hindmost part, the anterior ones being simple. Anal of similar form and structure, but containing never more than 3 spines. Caudal rounded or obtuse. Pectorals rounded and broad. Ventrals inserted below them, with a spine and 5 branched rays, the middle ones the longest; in one case they are simple and strongly prolonged. Six branchiostegals; gillopening wide, reaching isthmus; pectinate or fimbriate pseudobranchiae; fourth gill free, resembling the anterior ones; lower pharyngeals separated; pylorial appendices wanting.

Distribution: Marine carnivorous fishes of small or medium size, living in tropical waters of the Indopacific and questionably in Cuba; giving the preference to costal water and coral reefs.

Note: From the Pseudochromidae, as described by Müller & Troschel and by Bleeker, are separated the Plesiopinae of Bleeker, including *Trachinops* Gthr., already described in our part V as the distinct families *Plesiopidae* and *Pseudoplesiopidae*. What remains: the genera *Pseudochromis*, *Nematochromis*, *Dampieria (Cichlops)*, *Pseudogramma* and the dubious genus *Gramma* of Poey, which may be neglected for the moment, as it is only incompletely known, are here united as a separate subfamily Pseudochrominae of the Serranidae; in a similar way as Jordan has done in his Classification of fishes 1923, but he gives it there the rank of a family, equivalent to the family Serranidae.

Supposing that this assemblage is a natural one, the question remains if it can claim that rank or can only be regarded as a subfamily of the Serranidae. About this question Regan[1] remarks: „The Pseudochromididae do not seem to me deserving of family rank. Except for the 2 lateral lines they are typical Serranidae, and Pseudogramma, with the spinous and soft-rayed portions of the dorsal fin subequal, connects Gramma with Pseudochromis and Cichlops". A few lines lower down we find the notice: „The aberant genus Pseudoplesiops differs from the Pseudochromidinae . . . .". We therefrom conclude that he prefers to give them the rank of a subfamily of the Serranidae. This seems to us to be their true position, according to our present knowledge of the Serranidae in their totality.

Key to the indo-australian genera of Pseudochromidinae.

I. Dorsal with 7, anal with 3 pungent spines. Spinous and soft-rayed portions of dorsal subequal. Gape of mouth reaching to behind eye. Praeoperculum superiorly with a flat spine. Vomer and palatines with teeth . . . . 1. *Pseudogramma* p. 119.

II. Not more than 3 dorsal and anal spines. Softrayed portion of dorsal much longer than the short spinous portion. Gape of mouth terminating before hindborder of eye. Praeoperculum entire.

  1. Dorsal with 2 slender, slightly pungent spines and numerous branched rays, anal with 3 stronger spines. Both fins scaly at their base. No palatine teeth. . . . . 2. *Dampieria* p. 121.

  2. Palatine teeth present. Dorsal and anal rays branched or only the posterior ones.

    a. Dorsal and anal with 3 rather strong, pungent spines (*Pseudochromis* s. str.) or only 2 weak, not pungent spines (*Leptochromis*). Base of these fins with a scaly sheath. Lateral lines tubulate. Ventrals normal . . . . 3. *Pseudochromis* p. 127.

    b. Dorsal and anal with 2 weak spines; most of the rays simple or only partly branched. Lateral lines formed by flat grooves only. Ventrals with a weak spine and strongly prolonged undivided rays . . . . 4. *Nematochromis* p. 137.

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[1] C. Tate Regan Ann. & Mag. Nat. Hist. (8) XII. 1913, p. 114.

1. **Pseudogramma** Bleeker

(Bleeker, Fam. Pseudochromidoïdes p. 24. Verh. Akad. Amsterdam, XV. (1873) 1875).

Oblong, with the dorsal profile rounded, compressed; covered by moderate ciliated scales, smaller on head where they are wanting on snout and jaws. Lateral line with sensory tubes, interrupted, its upper part running parallel to base of dorsal, terminating below its hinder rays; the lower part recommencing before that termination and ending in the middle of the base of caudal. Jaws about equal, cleft of mouth wide, slightly oblique, not curved, reaching to behind eye. Praeoperculum with an upper flat spine; cheeks covered by about 14 oblique series of small scales; operculum prolonged into a triangular flap, covering base of pectorals. Teeth small, pluriseriate, slightly enlarged in front of jaws, canines or caninoids wanting; patches of small teeth on vomer and palatines. Dorsal originating above base of pectorals, with 7 pungent, rather distant spines, nearly subequal, much lower than the dorsal rays; their membrane deeply incised and covered by scales. Numerous (19—20) branched dorsal rays, forming together a portion of the dorsal which equals about the spinous part, it is rounded and scaly at its base and lower than half height of body. Anal of similar form and structure, with three pungent spines, the second one the longest and strongest. Caudal rounded. Pectorals rounded, with a densely scaly base. Ventrals short with a strong short spine and five rays, the third ray the longest. Gillopening wide open to isthmus; six (to seven?) branchiostegals, pseudobranchiae fringed.

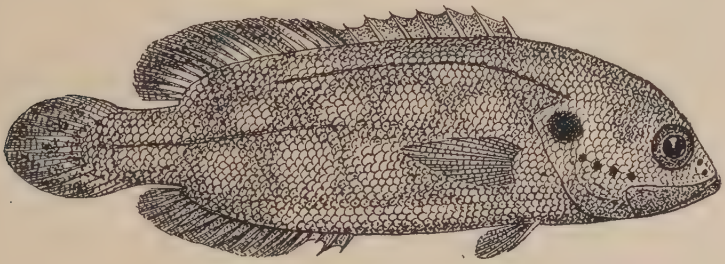
Fig. 21. *Pseudogramma polycanthus* Blkr. ×2.

Distribution: Small marine fishes living in costal water and on coralreefs. Distribution that of the single species known.

Note. Originally the only known species of *Pseudogramma* was included by Bleeker in the genus *Pseudochromis*. Later on he lay stress upon the important differences of that species from the species of *Pseudochromis*, in the structure of the dorsal fin, in the structure of the parts of the mouth, with its wide gape reaching behind eye, in the teeth where canines or caninoids are wanting, in the smallmess of the scales on opercular apparatus and cheeks, in the simple armature of the praeoperculum and other differences. He was inclined to recognize a relation with the Cuban genus *Gramma* of Poey and named therefore his new species *Pseudogramma*, placing it in the family Pseudochromidae of Müller & Troschel, which is discussed above (p. 117). It takes a questionable position in that family, though also Regan (1913) emphazises, that *Pseudogramma*, with the spinous and soft-rayed portions of the dorsal fin subequal, connects *Gramma* with *Pseudochromis* and *Cichlops* (*Dampieria*) and D. St. Jordan (1923) places *Pseudogramma* together with *Gramma* in his family Pseudochromidae.

1. **Pseudogramma polyacanthus** Blkr. [Fig. 21, p. 119].

Pseudochromis polyacanthus Bleeker, Nat. Tijdschr. Ned. Indië X. 1856, p. 375.
Pseudochromis polyacanthus Günther, Cat. Brit. Mus. II. 1860, p. 258.
Pseudochromis polyacanthus Kner, Sitzb. Akad. Wien LVI. 1867, p. 717.
Pseudochromis polyacanthus Günther, Südsee-Fische, II. Journ. Mus. Godeffroy 1876, p. 159.
Pseudogramma polyacanthus Bleeker, *Pseudochromidoides* p. 24. Verh. Akad. Amsterdam XV. (1873) 1875. — Atl. ichth. IX. 1877, Tab. CCCLXXXIX. Fig. 3.
Pseudogramma polyacanthus Bryan & Herre, Occ. Papers B. P. Bishop Mus. II. Honolulu 1903, p. 139.
Pseudogramma polyacanthus M. Weber, Siboga-Exp., Fische, Leiden 1913, p. 266.
Pseudogramma polyacanthus de Beaufort, Bijdr. Dierkunde, Leiden 1913, p. 119.
Pseudochromis polyacanthus Fowler, Fish. Oceania, Mem. Bishop Mus. X, 1928, p. 189.

D. VII. 19—20 (21); A. III. 16—17; P. 15; V. I 5; Sq. lat. 48—50.

Height 3.50—3.75 in length, 4 in length with caudal. Head nearly 3 in length, $3^1/_3$ in length with caudal, pointed, its rostro-dorsal profile strongly sloping, rectilinear or slightly convex, scaly, only snout and jaws naked; about 14 oblique series of scales on cheeks; opercle unarmed, its triangular flap produced; praeopercle superiorly with a pointed flat spine. Eye 4 in head, nearly half its diameter longer than interorbital space, longer than snout. Jaws equal, reaching behind eye. Cleft of mouth rather wide, slightly oblique. Teeth in jaws pluriseriate, the anterior ones slightly longer, canines or caninoids are wanting; on vomer and palatines patches of small teeth. Scales ciliated; between upper corner of gill-opening and caudal 48—50 transverse series of scales. Lateral line tubulate, beginning at that corner; its upper part runs parallel to the dorsal, separated from it by 4 scales and terminates below the middle of the soft-rayed dorsal; lower lateral line originating before the termination of the upper one, separated from it by six scales. Dorsal commencing above base of pectorals, with 7 pungent, distant, subequal spines, much lower than the rays, their membrane deeply incised, covered with scales; the soft-rayed portion, with 19—20 branched rays, rounded, not half as high as height of body, scaly at its base. Anal of similar form and structure, with three pungent spines of which the middle one is the longest and strongest. Caudal rounded, equals about the postocular part of the head and is slightly shorter than pectorals which are rounded and have the base densily scaled. Ventrals short, rounded, the third ray the longest. Colour in alcohol uniform darkbrown with a darker reticulated marking; opercle anteriorly with a large dark spot. Length 63 mm.

Habitat: Timor; Lamakera!; Ambon!; Ceram; Ternate; Batjan; Kabala dua!; Celebes Sea!; New Guinea (Doreh). — Seychelles Group, Amirante, Tahiti, Fiji, Hawaii, Marcus Island.

2. **Dampieria** Castelnau.

(Dampieria Castelnau, Res. Fish. Australia in Offic. Record, Philadelphia Centennial Exhib. 1876. Melbourne, 1875, p. 30).

Cichlops Müller & Troschel, Horae ichthyol. III. 1849, p. 24. (Preoccupied by Cichlops Gray, Cat. Birds Nepal, 1846, p. 77).

Labracinus Schlegel, Handleiding Beoef. d. Dierkunde, II. 1858, p. 121. (nomen nudum).

Elongate, head and body compressed, covered with ciliated scales of moderate size, 60 or somewhat more transverse series between upper corner of branchial opening and root of caudal. Lateral line with sensory tubules, interrupted, beginning at said corner and rising, strongly curved, to below about 4th ray of dorsal; from there it runs parallel to dorsal, separated from it by three scales and terminates before end of dorsal.

The lower lateral line, separated by 5 to 6 scales from the upper one, commences somewhat before the end of the upper one. Head scaly above, on cheeks and on opercular apparatus; obtuse, convex. Cleft of mouth very oblique, somewhat curved, nearly reaching the lower profile and terminating before hind-border of eye. Lower jaw the longest. Praeoperculum entire, operculum unarmed; six branchiostegals, gillrakers short, pseudobranchiae present. Teeth in upper jaw pluriseriate, the outer series with larger conical ones, unequal or subequal in size, anteriorly with a strong, grooved canine; in the lower jaw two or more similar canines in a symphysial patch of smaller teeth, followed by a single series of conical teeth of unequal size. On vomer a slender semilunar row of small teeth; none on palatines and tongue. A single dorsal, originating before or above hindborder of opercle, with 2 slender, slightly pungent spines and 24 to 26 branched rays; anal with 3 slightly stronger spines and 14—15 rays. Membrane of both fins not incised, scaly at its base. Ventrals close together, with the third ray the longest, the first spine-like, inserted below or slightly before origin of pectorals, which have a broad base and a rounded margin. Caudal rounded or somewhat acuminate in the middle, its basal membrane scaly, its peduncle strongly compressed.

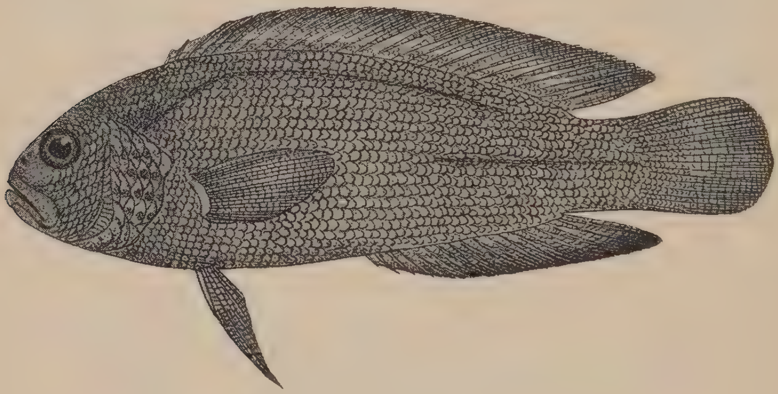

Fig. 22. *Dampieria spilopterus* (Blkr.). $^6/_7$ nat. size.

Distribution: Marine, carnivorous fishes of small or medium size, living in the littoral zone and frequenting the flooded coral reefs in the indo-australian Archipelago, especially in its eastern part, in the Philippine Archipelago and extending to Japan, the Riu-Kiu Islands and Eastern and Western Australia (Dampier Archipelago and Houtmans Abrolhos).

Key to the indo-australian species of Dampieria.

I. Body with 10 or more longitudinal black bands 1. *D. melanotaenia* p. 123.
II. Body without black bands.
  1. A transverse series of 20 to 21 scales between ventrals and dorsal.
    a. Posterior rays of dorsal much longer than the anterior ones; 4 to 5 oval black spots between 5th to 9th dorsal ray . . . . . 2. *D. trispilus* p. 124.
    b. Dorsal rays nearly equal in height. Dorsal without black spots . . . . 3. *D. cyclophthalmus* p. 125.
  2. A transverse series of 24 scales between ventrals and dorsal. Posterior rays of dorsal more than twice longer than anterior ones. Dorsal without black spots. . . . . 4. *D. spilopterus* p. 126.

1. **Dampieria melanotaenia** (Blkr.).

Cichlops melanotaenia Bleeker, Nat. Tijdschr. Ned. Indië III. 1852, p. 765.
Cichlops melanotaenia Günther, Cat. Brit. Mus. II. 1860, p. 259.
Cichlops melanotaenia Bleeker, Verh. Akad. Amsterdam XV. (1873) 1875. Pseudochromidoïdes p. 7. — Atl. ichth. IX. 1877, Tab. CCCXC. Fig. 5.
Labracinus melanotaenia Evermann & Seale, Bull. Bureau fisheries XXVI. Washington (1906) 1907, p. 95 1)).
Cichlops melanotaenia Jordan & Richardson, Bull. Bureau fisheries XXVII. Washington (1907) 1908, p. 261.

D. II. 25—26; A. III. 14—15; P. 19; V. I, 5 Sq. lat. ca. 62.

Height more or less than thrice in length, about 4 in length with caudal. Head about 4 in length with caudal; obtuse, convex, with 7 to 8 longitudinal series of scales on cheeks. Eye 4 in head; head scaly, its praeorbital part and the jaws naked. Upper jaw the shorter, reaching to middle of eye or somewhat farther. About 62 transverse series of scales between upper corner of branchial opening and root of caudal. 20 to 21 scales in a transverse series between ventrals and dorsal. Upper lateral line arises from upper corner of branchial opening, runs from 4th ray parallel to dorsal, separated from it by 3 scales and terminates about below the 19th ray.

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1) The authors erroneously quote *Pseudochromis melanotaenia* Bleeker, Atlas ichth. IX. pl. CCCXC. fig. 5 as a synonym. The quotation must be *Cichlops melanotaenia* Bleeker. *Pseudochromis melanotaenia* Bleeker belongs to an other genus and is by Bleeker represented in fig. 7 of the quoted plate.

The lower lateral line commences below the 15th dorsal ray separated from the upper one by 5 scales. Upper jaw with an outer series of larger conical teeth and 1 to 2 curved canines anteriorly, and an inner series of smaller teeth; lower jaw only anteriorly pluriseriate, with 2 to 4 canines, behind them a series of unequal conical teeth, with a pair of larger ones in the middle; a semilunar, gracile row of teeth on vomer. Dorsal commences before vertical through base of pectorals; posteriorly acute by its longest rays which are nearly twice longer than the anterior rays; anal of similar form; caudal rounded. Base of membrane of these fins scaly. Origin of ventrals behind base of pectorals. Colour in life reddish brown above, reddish below; body with 10, about equidistant blackish narrow longitudinal bands, beginning before end of pectorals. The first running above upper lateral line, the second and third below it and reaching to below end of dorsal. The fourth to eighth line ending at base of caudal; the ninth and the short tenth near base of anal and not surpassing it. Dorsal, anal and caudal with a blackish, in life bluish margin. Dorsal anteriorly spotted, posteriorly with small, longitudinal lines. Brown, in life blue, oblique, downward descending lines on cheeks and before eyes, reaching upper jaw. These lines may fade or are represented by a series of brown or red spots, as also the longitudinal lines on body may consist of series of large spots. Length 223 mm.

Habitat: Banka; Biliton; Celebes (Macassar); Sangir Islands. — Philippines.

2. **Dampieria trispilus** (Blkr.).

Cichlops trispilos Bleeker, Nat. Tijdschr. Ned. Indië IX. 1855, p. 110.

Cichlops trispilus Bleeker, Verh. Akad. Amsterdam XV. (1873) 1875, p. 10. — Atl. ichth. IX. 1877, Tab. CCCXC. Fig. 2.

Labracinus trispilos Evermann & Seale, Bull. Bureau fisheries XXVI. (1906) 1907, p. 95.

D. II. 25—26; A. III. 14—15; P. 18; V. 1.5; Sq. lat. 60—65.

Height about 4 in length. Head $4^2/_3$—$4^3/_5$ in length; obtuse, convex, upper jaw shorter than the lower, reaching to below posterior half of eye; on the cheeks 7 to 8 longitudinal series of scales. Eye about 4 in head, its diameter longer than snout. Teeth in upper jaw pluriseriate, with an outer series of larger ones of unequal size and 1 to 2 curved canines anteriorly;

lower jaw with a patch of pluriseriate teeth at symphysis and 2 to 4 curved canines, followed by a series of unequal conical teeth, the middle ones the largest; vomerine teeth in a slender, semilunar row. Between upper corner of branchial opening and root of caudal about 62 transverse series of scales; about 20 in a transverse row between base of ventral and dorsal. Upper lateral line reaching to about 19th dorsal ray, separated by 3 scales from dorsal. Lower lateral line commences opposite to about 15th dorsal ray, separated from upper lateral line by 5 scales. Origin of dorsal before vertical through base of pectoral; its rays increasing in size posteriorly, the longest forming an acute posterior angle, being much less than twice longer than the anterior ones. Anal of similar form. Caudal rounded. Base of membrane of these fins scaly. Colour brownish-red anteriorly and superiorly, reddish below. Cheeks and antorbital part of head with oblique descending dark lines, bluish in life; reaching to upper jaw and encircling the eye posteriorly. Occiput and back with blue dots. Dorsal, anal and caudal with dark, in life with blue edge. Upper half of dorsal with short narrow stripes of similar colour and 3 spots between the 6th to 9th ray. Length 140 mm.

Habitat: Halmahera, Ternate, Batjan, Gebe. — Philippines.

3. **Dampieria cyclophthalmus** (Müll. & Trosch.).

Cichlops cyclophthalmus Müller & Troschel, Horae ichthyol. III. Berlin 1849, p. 24.
Cichlops japonicus Gill, Proc. Acad. Nat. Sc. Philadelphia, 1859, p. 147.
Cichlops cyclophthalmus Günther, Cat. Brit. Mus. II. 1860, p. 259.
Cichlops cyclophthalma Jordan & Snyder, Proc. U. S. Nat. Mus. XXIV. 1902, p. 491.
Cichlops cyclophthalmus Bleeker, Verh. Akad. Amsterdam XV. (1873) 1875, p. 8. — Atl. ichth. IX. 1877, Tab. CCCXC. Fig. 8.
Dampieria cyclophthalma Jordan, Tanaka & Snyder, Journ. Coll. Sci. Univ. Tokyo XXXIII. Art. 1, 1913, p. 188.

D. II. 24—25; A. III. 14—15; P. 19; V. I. 5; Sq. lat. 60—65.

Height somewhat more than length of head, which goes about 4 times in length, nearly 5 in length with caudal. Head obtuse, with a short snout, shorter than eye, and a flatly curved profile; scaly, only the jaws and the antorbital region naked; on the cheeks 7 longitudinal series of small scales. Eye about 4 times in head and equal to interorbital space. Lower jaw much the longer, its chin prominent. Upper jaw slightly surpasses the vertical through the frontborder of the eye. The lateral line arises from the top of the branchial opening, to about the 4th dorsal ray and follows the dorsal profile till about the 20th ray, forming with about 44 perforated scales the upper part of the lateral line; the lower part of the lateral line begins with a series of 3 scales without sensory tubes, followed by about 16—17 sensory scales. There are 60 to 65 transverse rows of scales between branchial opening and root of caudal and 20 to 21 scales between ventrals and dorsal. Rays of dorsal of nearly equal height, those of anal increasing in length posteriorly; caudal rounded, the two middle rays somewhat produced. Height of caudal peduncle slightly less than its length. Upper jaw with 1 to 4 curved canines followed by a series of smaller conical and an inner series of cardiform teeth. Lower jaw anteriorly with 2 to 4 canines and a patch of cardiform teeth followed by a series of smaller conical teeth. Vomer anteriorly with a series of small teeth; none on palatines and tongue. Colour in alcohol yellowish to light brown, darker on back. Eye encircled by a dark (in life blue) line; similar lines, which easily fade, run obliquely forward and downward on the cheeks. Fins yellowish, dorsal, anal and caudal with a blue margin in life; dorsal with dark (in life blue) dots. Paired fins without markings. Length 170 mm.

Habitat: Celebes (Menado). — Japan.

4. **Dampieria spilopterus** (Blkr.) [Fig. 22, p. 122].

Cichlops spilopterus Bleeker, Nat. Tijdschr. Ned. Indië V. 1853, p. 168.
Cichlops Hellmuthi Bleeker, Nat. Tijdschr. Ned. Indië VI. 1854, p. 329.
Cichlops spilopterus Günther, Cat. Brit. Mus. II. 1860, p. 259.
Cichlops spilopterus Bleeker, Verh. Akad. Amsterdam, Fam. d. Pseudochromidoïdes XV. (1873) 1875, p. 11. — Atl. ichth. IX. 1877, Tab. CCCXC, Fig. 9.
Cichlops Hellmuthi Bleeker, l. c. p. 12. — Atl. ichth. IX. 1877. Tab. CCCXC. Fig. 4.
Cichlops spiloptera Jordan & Richardson, Bull. Bureau fisheries XXVII. (1907) 1908, p. 261.
Dampieria spiloptera Snyder, Proc. U. S. Nat. Mus. 42, 1912, p. 505.
Cichlops spilopterus M. Weber, Siboga-Exped. Fische, Leiden 1913, p. 265.
Dampieria hellmuthii Fowler, Fish. Oceania, Mem. Bishop Mus. X. 1928, p. 189.
Dampieria spiloptera Fowler, ibid.

D. II. 24—26; A. III. 14—15; P. 19; V. I. 5; Sq. lat. 62.

Height about 3, 3.5 in length with caudal. Head $3^3/_4$—4 in length, $4^3/_4$ or more in length with caudal, obtuse, convex, with 7—8 longitudinal series of scales on cheeks. Diameter of eye $3^1/_2$ to $3^1/_3$ in head, shorter than snout. Upper jaw reaching to below middle of eye. Teeth in upper jaw pluriseriate, those in the outer series larger, conical and subequal, with 1 to 2 curved canines in front; teeth in lower jaw forming a symphysial patch with 2 to 4 curved canines and a single series of unequal conical teeth behind, those in the middle larger. Vomerine teeth in a slender semilunar row. About 62 scales between upper corner of branchial opening and root of caudal, about 24 scales in a transverse series between base of ventrals and dorsal. Upper lateral line originates at upper corner of branchial opening, rises in a convex line to about fourth ray of dorsal and runs thence parallel to dorsal, separated from it by 3 scales and terminates below the 18th — 20th ray. The lower lateral line commences about below the 15th to 16th ray, separated by 5 or 6 scales from upper lateral line and contains about 18—20 tubulated scales. Dorsal originates above hindborder of opercle, its height gradually increases, the posterior rays reaching about twice the length of the most anterior ones and giving the dorsal an acute hinder angle; anal of similar form; caudal bluntly rounded. Membrane of these fins scaly at its base. Colour in life dark red, lighter below, each scale with a small blue spot; blue lines on cheeks and before eye, opercle spotted. In alcohol the spots easily fade and may completely disappear, the lines get dark, as also the blue margin of the unpaired fins and the spots and waving lines on dorsal. There may be present a dark spot superiorly at the root of the pectorals. Length 225 mm.

Habitat: Biliton; Celebes (Macassar, Menado); Sangir Islands; Karkaralong Islands!; Batjan; Obi major; Flores; Rotti!; Solor!; Lamakera!; Kei Islands!; Waigeu. — Philippines (Fuga Islands, Calayan), Japan (Okinawa).

Note: One of us (Siboga-Expeditie, Fische 1913, p. 266) has tried to make it probable, that *Cichlops Hellmuthi* Blkr. belongs to *D. spilopterus* Blkr. and can not specifically be distinguished from it.

3. **Pseudochromis** Rüppell.

(Rüppell, Neue Wirbelthiere, Fische, 1835, p. 8).
Assiculus Richardson, in Stokes, Discov. in Austral. I. 1846, p. 492.
Nesiotes de Vis, Proc. Linn. Soc. N. S. Wales VIII. 1884, p. 453.
Onar de Vis, Proc. Linn. Soc. N. S. Wales IX. 1885, p. 875.

Head and body compressed, covered with moderately large ctenoid scales which extend on occiput and behind eye and are arranged in five or six transverse series on the cheeks and are iregular and very large on operculum, the other parts of the head being naked. Lateral line with sensory tubules; interrupted; its upper part rises rapidly from the upper corner of the branchial opening to the dorsal and runs parallel to it to the posterior part of the dorsal, separated from its base by two scales. Three to six scales below its termination commences the lower part which reaches to the caudal. Opercular apparatus unarmed or armed with flat spines; it is provided with sensory canals which also are found around eye. Jaws nearly equal, reaching to below eye; cleft of mouth oblique. Upper jaw with a patch of villiform teeth anteriorly, with one or two pairs of strongly curved canines, behind them a single series of conical or cardiform teeth; in the lower jaw, near symphysis a patch or band of villiform teeth with one

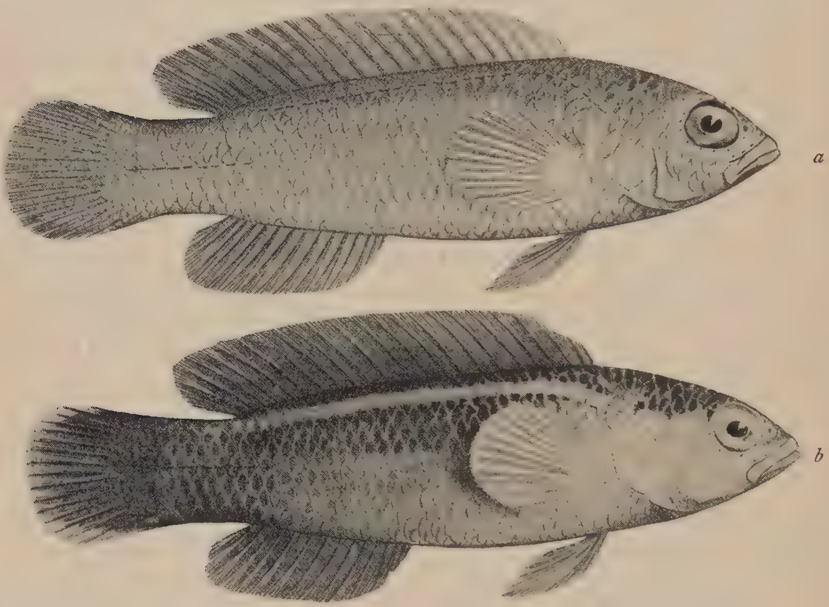

Fig. 23. *Pseudochromis tapeinosoma* Blkr. *a.* female (54.5 mm.) *b.* male (56 mm.). We have preferred to give a copy of this beautiful figure of the late Dr. McCulloch in stead of an original one, in honour of the memory of the able australian ichthyologist.

or two pairs of canines or caninoid teeth followed by cardiform or conical teeth. Vomer and palatines with a patch of cardiform or with a row of stronger teeth. Dorsal and anal with three rather strong, pungent spines, generally increasing in size posteriorly (Subgenus *Pseudochromis* Blkr.) or with only two weak, not pungent spines (subgen. *Leptochromis* Blkr) [1]; the numerous rays are all branched or the anterior rays in varying number are simple, the posterior branched. Caudal rounded or pointed its basal half covered with scales. Base of dorsal and anal with a scaly sheath. Pectorals rounded. Ventrals with a spine and five rays, the middle ones the longest and pointed, inserted below or somewhat before pectorals.

Distribution: Small marine fishes, living on coral reefs and in costal water in the Indo-Pacific from Red Sea, Natal, Gulf of Persia, Indian Seas to China, Philippines, Australia, Pacific Islands as far as New Hebrides and Carolines. Numerous in the indo-australian region.

Key to the indo-australian species of Pseudochromis.

I. Dorsal and anal with three rather strong pungent spines. D. III. 25—28. Second ray of ventral the longest (Subgenus *Pseudochromis* Blkr.).	
1. Third anal spine the longest	1. *Ps. fuscus* p. 130.
2. Second anal spine conspicuously the longest and strongest	2. *Ps. ransonneti* p. 132.
3. Second and third anal spine of equal size. A black band from snout through eye along base of dorsal	3. *Ps. perspicillatus* p. 132.
II. Dorsal and anal with only two slender, non pungent spines. D. II. 21—23. Third ray of ventral the longest (Subgenus *Leptochromis* Blkr.).	

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1) McCulloch distinguishes in his key of the australian species of *Pseudochromis* (Biol. Res. „Endeavour" V. 1926, p. 186) the two subgenera *Pseudochromis* and *Leptochromis* of Bleeker, according to the differences of structure of the dorsal and anal, if they have some anterior rays simple, the posterior branched, or all the dorsal and anal rays branched. This is erroneous as in both subgenera one or the other condition may occur. Bleeker founded his two subgenera on the above noticed difference in the dorsal and anal spines. In *Pseudochromis* s. s. there are three rather pungent spines, in *Leptochromis* two rather weak and not pungent ones; though it may be true, that there are three, but in that case the first is scarcely discernible as McCulloch remarks for *Ps. tapeinosoma*.

1. About 40 scales between gillopening and root of caudal. A blackish band along base of dorsal, continued on caudal, forming a semicircle to hindmargin of anal . . . . 4. *Ps. melanotaenia* p. 133.
2. About 33 scales between gillopening and root of caudal.
    - *a.* Body behind pectorals with 8 to 9 blue transverse bands. All dorsal and anal rays branched . . . . 5. *Ps. cyanotaenia* p. 135.
    - *b.* Without any bands. Anterior dorsal rays simple . . . . 6. *Ps. tapeinosoma* p. 135.

1. Pseudochromis (Pseudochromis) fuscus Müll. & Trosch.

Pseudochromis fuscus Müller & Troschel, Horae ichthyol. Heft III. Berlin 1849, p. 23.
Pseudochromis fuscus Bleeker, Nat. Tijdschr. Ned. Indië III. 1852, p. 708. — l. c. IX. 1855, p. 69. — Verh. Akad. Amsterdam, Fam. Pseudochromidoïdes XV. (1873) 1875, p. 16. — Atl. ichth. IX. 1877, Tab. CCCLXXXVIII. Fig. 4.
Pseudochromis xanthochir Bleeker, Nat. Tijdschr. Ned. Indië VIII. 1855, p. 443. — Verh. Akad. Amsterdam, Fam. Pseudochromidoïdes XV. (1873) 1875, p. 17. — Atl. ichth. IX. 1877, Tab. CCCLXXXVIII. Fig. 1.
Pseudochromis fuscus Günther, Cat. Brit. Mus. II. 1860, p. 257.
Pseudochromis xanthochir Günther, ibid.
Pseudochromis adustus Günther, Cruise of the Curaçao 1873, p. 407.
Pseudochromis fuscus Günther, Fische d. Südsee II. Mus. Godeffroy XI. 1876, p. 159 (salve synon.).
Pseudochromis xanthochir Day, Fishes of India 4^0 1878—1888, p. 267 (changed in *Ps. fuscus* on p. 791).
Onar nebulosum De Vis, Proc. Linn. Soc. N. S. Wales IX. 1885, p. 875.
Pseudochromis fuscus Day, Fishes of Brit. India II. 1899, p. 227.
Pseudochromis wildii Ogilby, Ann. Queensl. Mus. N°. 9, 1908, p. 34.
Pseudochromis fuscus M. Weber, Siboga-Exped. Fische, Leiden 1913, p. 262.
Pseudochromis fuscus de Beaufort, Bijdr. Dierk. Leiden 1913, p. 119.
Pseudochromis nebulosus McCulloch, Mem. Queensl. Mus. III. 1915, p. 49.
Pseudochromis (*Pseudochromis*) *fuscus* McCulloch, Biol. Res.: „Endeavour" V. prt. 4, 1926, p. 186.
Pseudochromis fuscus Whitley, Rec. Austr. Mus. XVI. 1927, p. 13.
Pseudochromis fuscus Fowler, Fish. Oceania, Mem. Bishop Mus. X. 1928, p. 189.

D. III. 25—28 (14—18 anterior not branched); A. III. 14—15 (1 or 2 anterior not branched); P. 18—19; V. I. 5; Sq. lat. ca. 40.

Height about 3 or slightly more in length with caudal; head somewhat pointed, about 3 in length, $3^3/_4$ to 4 in length with caudal, its rostro-frontal profile moderately convex. Eyes 3.2—3.5 in head; their distance less than diameter of eye and about equal to length of snout. Lower jaw slightly longer than upper one, which reaches nearly to vertical through middle of eye. Cheeks with 5 to 6 longitudinal series of scales. Upper lateral line with more or less than 30 tubulated scales, running to about 15th ray of dorsal, separated from it by 2 scales; lower lateral line with 8—10 tubulated scales; separated from the upper one by 4 scales and running to base of caudal. About 40 rows of scales between upper corner of gill-opening and root of caudal. In anterior part of jaws a patch of pluriseriate small teeth with 2 to 3 curved canines, behind them a series of cardiform teeth, in the lower jaw unequal, conical, the middle ones larger. On vomer a row of moderately strong teeth and a slender band on palatines. Dorsal and anal with 3 moderately strong, pungent spines, increasing in size posteriorly. Dorsal with 14 to 18 anterior simple rays, the posterior being branched, increasing in size posteriorly, the longest nearly reaching length of head without snout; dorsal rounded behind and when depressed reaches on caudal. Anal of equal form with one or two anterior rays simple. Both fins with a basal sheath of scales. Caudal obtusely rounded, its basal half scaly. Ventrals inserted below base of pectorals, their second ray the longest, about as long as head. Colour in alcohol brown above, lighter below; at base scales with a darker spot, forming rows along the sides. Fins lighter or darker brown with an intramarginal band on caudal and a basal band on pectorals darker; in *Ps. xanthochir* Blkr. they are wanting. Length 93 mm.

Habitat: Simalur!; Batu; Biliton; Java (Patjitan); Bawean; Kabala dua; bank of Borneo!; Kaniungan ketjil!; Celebes (Menado, Tanawanko); Sangir Islands; Saleyer!; Salibabu!; Flores; Sumba!; Solor; Timor; Buru; Ceram; Ternatae; Batjan; Ambon!; Salomakië!; Banda; Kei Islands!; Roma!; Goram; Waigeu. — Andamans, Torres Strait, Moreton Bay, West Australia, Queensland, New Britain, Duke of York Island, Solomon Islands, Yap, Palau Islands [1]).

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[1]) Bleeker observed, that the species is wanting along the coasts of Sumatra, Java and Borneo. We also never saw specimens from these islands, only from the Island Simalur at the West coast of Sumatra and from some islands (Kabala dua and Kaniungan Ketjil) near the east coast of Borneo. Though the species seems to be wanting in the Java Sea in accordance with the feeble development of coral reefs in that sea.

2. **Pseudochromis (Pseudochromis) ransonneti** Steind.

Pseudochromis Ransonneti Steindachner, Sitzber. Akad. Wien LX. 1869, p. 562.
Pseudochromis (*Pseudochromis*) *Ransonneti* Bleeker, Verh. Akad. Amsterdam, Fam. Pseudochromidoides, XV. (1873) 1875, p. 19.

D. III. 23; A. III. 14; Sq. lat. 40.

Height in male $4^1/_2$ to $4^3/_5$, in pregnant female less than 4; head 4 or slightly more in total length. Eye $3^1/_2$, snout somewhat more than 4 to nearly 5 times in head. Four series of scales on cheeks. Dorsal and anal pointed posteriorly; the hindmost rays of both fins in the male somewhat longer than in the female; those of the dorsal surpass in the male the base of the caudal, and reach in the female to that base. Second anal spine conspicuously stronger and longer than the third. Olive brown above, with a darker spot in the centre of each scale; lower half of body yellowish-green. A dark longitudinal band on sides of snout, terminating behind eye with a narrow transverse stripe. Lower lip anteriorly with a blackish edge. Upper and lower margin of caudal with a rather broad longitudinal band of greenish or reddish-yellow colour. Length not known. [After STEINDACHNER, not seen by us].

Habitat: Singapore.

Note. Only the specimens of Steindachner are known. Bleeker reproduced the description of Steindachner and observed, that the species must easily be recognised by the exceptional length of the second anal spine and by the black rostro-postocular band, while a similar band in *Ps. perspicillatus* Gthr. reaches to the hindpart of the back; besides *perspicillatus* has 45 lateral scales, 5 to 6 series of scales on the cheeks and the third anal spine the longest.

3. **Pseudochromis (Pseudochromis) perspicillatus** Gthr.
[Fig. 24 p. 133].

Pseudochromis perspicillatus Günther, Proc. Zool. Soc. London 1862, p. 193.
Pseudochromis perspicillatus M. Weber, Siboga-Exp. Fische, Leiden 1913, p. 263.

D. III. 25; A. III. 14–16; P. 16; V. I. 5; Sq. lat. 44–45.

Height somewhat more than length of head, which goes nearly 3.5 in length and 4.6 in length with caudal. Head pointed, scaly, also below and before eyes, front naked; on opercles large, irregularly arranged, on cheeks in 5—6 oblique series. Jaws subequal, reaching to below anterior half of eye;

cleft of mouth oblique. Eye about 4 in head, nearly equal to length of snout and more than interorbital space. Upper lateral line with 32—33 tubulated scales, separated by $1^1/_2$ scale from dorsal, reaching to hinder dorsal rays; lower lateral line commencing before termination of the upper one, both separated by 5 scales and containing 8—10 tubulated scales. Jaws with an anterior patch of pluriseriate small teeth, in upper jaw with at least 4 canines of different size, behind them a series of cardiform teeth; in lower jaw with 2 rather strong canines, behind them unequal conical teeth, the middle ones larger. Teeth on vomer and palatines. Dorsal with 3 pungent spines, increasing in size posteriorly, and all the rays branched, though the anterior ones only slightly; the increase in height posteriorly only slightly; dorsal rounded behind. Anal of similar form and structure, but the two posterior spines are subequal and much longer than the anterior spine. Caudal subtruncate, scaly at its base. Pectorals rounded; ventrals inserted below base of pectorals, their second ray the longest. Colour in alcohol uniform reddish-brown; a blackish band running from extremity of upper jaw through eye to about middle of base of the dorsal and terminating near its end. Above it on the nape, the scales may show dark spots, and the base of the dorsal is dusky in its hinder half. Length 89 mm.

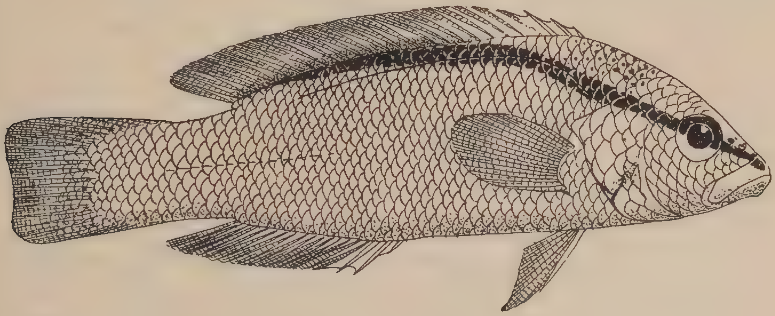

Fig. 24. *Pseudochromis* (*Pseudochromis*) *perspicillatus* Gthr. $^3/_4$ nat. size. After M. Weber.

Habitat: Kei islands, on reefs!. — China (locality not known).

4. Pseudochromis (Leptochromis) melanotaenia Blkr.

Pseudochromis melanotaenia Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 273.
Pseudochromis (*Leptochromis*) *melanotaenia* Bleeker, Verh. Akad. Amsterdam,

Fam. Pseudochromidoïdes XV. (1873) 1875, p. 20. — Atl. ichth. IX. 1877, Tab. CCCXC, Fig. 7.

Pseudochromis melanotaenia de Beaufort, Bijdrag. tot de Dierkunde, Leiden 1913, p. 119.

D. II. 21—23; A. II. 13—14; P. 18—19; V. I. 5; Sq. lat. circ. 35—40.

Height somewhat less than head, which goes about $3^1/_4$ in length, 4 in length with caudal. Head acute, somewhat convex, scaly on occiput, front and opercles; 4 transverse series on cheeks. Eye about thrice in length of head, twice length of acute snout. Teeth of upper jaw pluriseriate, in the outer series larger, with 3 canines anteriorly; in the lower jaw 2 anterior canines, the posterior of which is the longest. Small teeth in a Λ formed band on vomer, on the palatines in a slender lateral band. About 40 transverse series of scales between upper corner of gillopening and root of caudal. Upper lateral line reaches to posterior part of dorsal, separated from it by 1 scale and containing about 22—25 tubulated scales; before its termination, separated from it by 3 scales the lower lateral line recommences and has about 6—9 tubulated scales. Dorsal originates above base of pectorals; the 2 spines are not pungent and much shorter than first ray; the first spine shorter than the second. The rays, the anterior ones of which are simple and about twice shorter than height of body, form a dorsal, rounded posteriorly. Anal posteriorly angulate, equals otherwise the dorsal. Caudal obtusely rounded. Ventrals with the third ray the longest, about equal to length of head without snout. Colour uniform brown, fins yellowish; along the base of dorsal a black band, a similar horse-shoe shaped band on caudal, running from upper base of caudal along its intramarginal border to lower base. The basal dorsal band may commence at the snout, cover the interorbital space and unite the dorsal bands, this is continued on the dorsal side of the tail and in a semicircle on the caudal, touching nearly the hindmargin of that fin and terminating at the hinder margin of the anal. The head and body may be minutely spotted with brown, more densely on some of the scales on the sides, so as to form brown patches. Length 44 mm.

Habitat: Timor; Ambon!. In sea.

5. **Pseudochromis (Leptochromis) cyanotaenia** Blkr.

Pseudochromis cyanotaenia Bleeker, Nat. Tijdschr. Ned. Indië XIII. 1857, p. 72.
Pseudochromis (*Leptochromis*) *cyanotaenia* Bleeker, Verh. Akad. Amsterdam, Fam. Pseudochromidoïdes XV. (1873) 1875, p. 21. — Atl. ichth. IX. 1877, Tab. CCCXC, Fig. 6.
Pseudochromis cyanotaenia M. Weber, Siboga-Exped. Fische, Leiden 1913, p. 263.

D. II. 21; A. II. 13—14; P. 17; V. I. 5; Sq. lat. ca. 33.

Height about 4, somewhat more than 5 in length with caudal. Head 3.6, about 4.3 in length with caudal, rostro-frontal profile convex; scaly on occiput, front, behind eye and on operculum; about 3 transverse rows of scales on cheeks. Eye about thrice in length of head; snout acute, much shorter than eye. Jaws nearly equal, reaching to middle of eye. Teeth in jaws pluriseriate, the upper one anteriorly with 3 caninoids, in the lower jaw 2. Vomerine teeth in a horse-shoe shaped band. About 33 transverse series of scales between upper corner of gillopening and root of caudal. Upper lateral line, separated by 1 or 2 scales from dorsal, contains about 24 tubulated scales and terminates below the hindmost rays; lower lateral beginning before the end of the upper one, separated from it by 3 scales, has about 6—7 tubulated scales. Dorsal originating above pectorals; with 2 slender flexible spines, the second the longest, much shorter than first ray; all the rays branched; dorsal lower than height of body, rounded behind. Anal of similar form and structure. Caudal and pectorals obtusely rounded; the last about equal to length of head without snout. Ventrals inserted below base of pectorals, their third ray the longest. Colour above and behind dark brown, much lighter on lower half of head, on sides of belly and inferiorly. Behind pectorals 8 to 9 transverse, hindwards obliquely descending, metallic blue lines, which may fade individually. Vertical fins brown or blackish; the upper half of the dorsal may show small longitudinal spots between the rays. Length 54 mm.

Habitat: Saleyer!; Tiur!; Buru; Ambon; Ceram; Kei Islands!.

6. **Pseudochromis (Leptochromis) tapeinosoma** Blkr.
[Fig. 23, p. 128].

Pseudochromis tapeinosoma Bleeker, Nat. Tijdschr. Ned. Indië IV. 1853, p. 115.
Pseudochromis tapeinosoma Günther, Cat. Brit. Mus. II. 1860, p. 258.

Pseudochromis (*Leptochromis*) *tapeinosoma* Bleeker, Verh. Akad. Amsterdam, Fam. Pseudochromidoïdes XV. (1873) 1875, p. 23. — Atl. ichth. IX. 1877, Tab. CCCXC, Fig. 1.

Pseudochromis tapeinosoma M. Weber, Siboga-Exped. Fische 1913, p. 263.

Pseudochromis (*Leptochromis*) *tapeinosoma* McCulloch, Biol. Results „Endeavour" V. prt. 4, 1926, p. 192.

Pseudochromis (*Leptochromis*) *tapeinosoma* Whitley, Rec. Austral. Mus. XVI. 1927, p. 14[1]).

D. II. 21—22 (some anterior simple); A. II. 13—14; P. 18; V. I. 5; Sq. lat. ca. 33.

Height about 3.7 in length, 4.5 in length with caudal. Head about 3.5 in length, 4.4 in length with caudal, obtusely pointed, covered by large cycloid scales, extending on interorbital space; 3 longitudinal rows on cheeks. Eye about 3.5 in head, much longer than snout. Jaws nearly equal, reaching to anterior third of eye. Upper jaw with a band of minute teeth, in front with up to 4 curved canines of equal length, an outer series of larger conical teeth; lower jaw in front with about 3 canines, an inner band of small and an outer series of larger conical teeth. Minute teeth on vomer and palatines. About 33 transverse series of scales between root of caudal and upper corner of gillopening. Upper lateral line originates at same corner and runs parallel to the dorsal to about the 17th ray of dorsal, separated from it by 1 or 2 scales. The lower lateral commences about below termination of the upper one, separated from it by 3 scales. Dorsal with two[2]) slender and very weak spines, much shorter than the anterior ray. All the rays branched or a few of the anterior ones simple; they increase in length posteriorly. Margin of the fin straight, rounded posteriorly. Anal of similar structure. Caudal obtusely rounded, its basal membrane covered by rows of scales. Pectorals rounded, about equal to head without snout. Ventrals with the second ray the longest. Colour uniform brown, with lighter anal, pectoral and ventral fins while young, in adult differing according to sex (McCulloch). The male is dark brown with the sides of the head and breast yellow; a broad light-coloured band extends backward from the head, and may reach the caudal peduncle or terminates below the dorsal; indications of several rows of narrow, slightly oblique and dark lines usually present in the young on the membrane of the dorsal, may persist. Female light brownish in general colour; dorsal usually marked with dark horizontal lines as in the young, and the caudal with a faintly darker inframarginal border. These markings vary in intensity. Length 56 mm.

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[1]) Whitley distinguishes in a later paper (Records Austral. Mus. XVII, 3, 1929, p. 113) two subspecies: *Leptochromis tapeinosoma wilsoni* subsp. nov., from North Australia, which differs, according to Whitley „from *Leptochromis tapeinosoma tapeinosoma* in having more dorsal rays (26), and appears to attain a larger size". To support the last statement he quotes as maximum length 53 mm. but we know of specimens of the original „*Leptochromis tapeinosoma*" at least 56 mm. long.

[2]) McCulloch writes the formula III. 22; but he calls the first spine „scarcely discernible".

Habitat: Sumatra (Trussan); Sumba!; Lamakera!; Lucipara Islands!; Buru; Ambon; Ceram; Beo; Karakelang Islands!; Tiur Island!; Great Kei Island!; Goram. — Philippines, Torres Strait, Queensland, New Hebrides.

4. **Nematochromis** M. Web.

(M. Weber, Siboga-Expeditie, Fische, Leiden 1913, p. 264).

Oblong, compressed, covered with ctenoid scales. Head pointed, cheeks and behind eye scaly, operculum unarmed, covered by irregular large scales. Cleft of mouth oblique; jaws equal, reaching below eye. Teeth in jaws partly caninoid, present on vomer and palatines. System of lateral line indicated by small, flat grooves only, interrupted: the upper lateral line terminating before end of dorsal, the lower commencing below the upper one. Dorsal and anal with two weak spines and numerous rays, most of them undivided or only partially branched. Likewise the obtuse caudal. Base of membrane of these fins not scaly. Pectorals rounded, with 15 branched rays. Ventrals with a weak spine and three undivided rays,

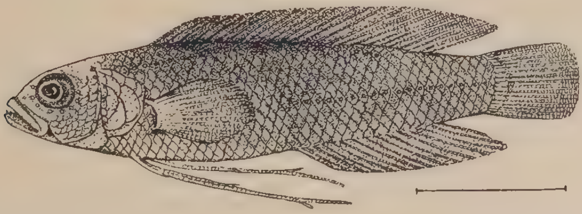

Fig. 25. *Nematochromis annae* M. Web. nat. size. After M. Weber.

the first and second of which is produced. Bones of head, especially the periorbital ones canalised.

Distribution: That of the single species known.

Note: *Nematochromis* is nearly related to *Pseudochromis*. It differs from that genus, which lives, as all typical *Pseudochromidinae*, on reefs and in undeep water of the coasts and coral reefs, by its habitat in deeper water up to 113 M. Accordingly the ventrals are reduced and their rays prolonged filaments; the sensory tubes of the lateral line are modified. the bones of the head are canalised, and other signs of a life in deeper water.

1. **Nematochromis annae** M. Web. [Fig. 25 p. 137].

Nematochromis Annae M. Weber, Siboga-Exped., Fische, Leiden 1913, p. 265.

D. 26—27; A. 15; P. 17; V. 1.3; Sq. lat. ca. 40; L. tr. 10–12.

Height more than 4 in length 5 in length with caudal. Head pointed, $3^1/_2$ in length, more than 4 in length with caudal; its profile feebly convex; its height nearly $^1/_3$ less than its length. Eye thrice in length of head; distance of eyes less than half their diameter, which is about $^1/_4$ longer than snout. Jaws about equal, the upper reaches to below middle of eye. Fine teeth in jaws mixed with some caninoids. Teeth on vomer and palatines present. Three longitudinal series of scales on cheeks; operculum unarmed, with few large scales. Upper lateral line originates at upper corner of branchial opening and runs in an oblique line to about middle of dorsal, separated from it by $^1/_2$ or $^3/_4$ scale; its superficial grooves occupying 30 scales. Similar scales, 15 in number, exist in the lower lateral line, separated by 3 scales from the upper one and commencing before its end. Dorsal and anal with two very weak spines, difficult to distinguish from the rays, which are not branched or only very inconsiderably. Rays of dorsal and anal increasing in length posteriorly and reaching on caudal, which has similar rays, equals the length of head without snout and is obtuse. Membrane of vertical fins not scaly at their base. Pectorals rounded, as long as head without snout, their rays branched. Ventrals with a weak spine and three undivided rays of which the first and second are threadlike prolonged, reaching on anal and equalling $2^1/_2$ times the total length. Colour in alcohol yellowish brown, lighter on head, belly and end of tail. Paired fins hyaline, the others dusky, anterior half of dorsal dark. Length 40 mm.

Habitat: Near Island Sarasa one of the Postillon Islands on corolbottom, 54 M.!; Solor-Strait, stony bottom, 113 M.!.

8. Family THERAPONIDAE.

Oblong to oblong-ovate, more or less compressed, covered with small or moderate, finely ciliated, adherent scales. Lateral line complete, its sensory scales usually smaller than the other scales, their tubes simple, straight, not quite extending to hindborder of scales. Axillary or inguinal elongate auxiliary scales wanting. Head on the occiput with bony ridges or rugae, with pointed or blunt snout, its sides covered with small, usually cycloid scales, naked above. Mouth terminal, protractile, its cleft moderate or small, generally oblique, the jaws equal or the upper longer; lips often thick, plicate; maxillary exposed, at least when mouth is opened; no supplemental bone. Gill-membranes separate or united, free from isthmus or united with it; six branchiostegals; pseudobranchiae large; gillrakers short and stout or longer and lanceolate, not numerous. Praeoperculum more or less strongly serrated; operculum with two pungent spines. Praeorbital serrated at least in the young. Suprascapular and coracoid bones generally exposed and denticulate or suprascapular covered with scales. Teeth in villiform bands in jaws, the outer series enlarged, or conical or flattened and arranged in separate, fixed rows, or more or less trilobate and pluriseriate. Vomerine and palatine teeth present or absent, sometimes deciduous. A single more or less deeply emarginate dorsal with a basal scaly sheath, its spinous portion with XII to XIII, rarely XI or XIV heteracanth spines, depressible in a groove, longer than soft portion, with 8 to 14 rays. Anal short with 3 strong spines, the first the shortest, occasionally minute, and 7 to 12 rays; a basal scaly sheath present. Caudal rounded, truncate or emarginate with 17 principal rays, 15 of which are divided. Pectorals with 12 to 16 rays, assymmetrical or symmetrically rounded. Ventrals inserted well behind base of pectorals, close together, with a strong spine and 5 rays.

Distribution. In proportions and colour rather dissimilar fishes of small or moderate size, living in the Indian and Western Pacific Oceans, from the Red Sea and eastern coasts of Africa and Madagascar to the Pacific Islands, some entering fresh water. Numerous species inhabit the fresh waters of Australia and New Guinea and are valued as food fish.

Key to the indo-australian genera of Theraponidae.

1. Teeth in jaws in a villiform band, the outer series more or less enlarged. Gillmembranes separate, with a slight adhesion to isthmus. Head usually large; gape of mouth moderate, oblique. D. (XI) XII—XIII, 8—13 . . . . 1. *Therapon* p. 140.
2. Teeth in upper jaw in three, in lower in two more or less regular series, the outer series much enlarged, brown, at least with brown tips, conical or somewhat flattened with a conical point. Gillmembranes united, nearly free from isthmus. Head large; gape of mouth moderate, oblique. D. XII. 10—13 . . . . 2. *Pelates* p. 160.
3. Teeth in jaws pluriseriate, brown, the outer series enlarged, flattened, lanceolate, trilobate or tricuspidate. Head small; gape of mouth small, square. D. XII—XIII, 10—13. Gillmembranes united, their posterior border free from isthmus . . . . 3. *Helotes* p. 164.

1. **Therapon** Cuvier [1].

(Cuvier, Règne Anim. Editio I, vol. II, 1817, p. 295).

Datnia Cuvier & Valenciennes, Hist. nat. Poiss. III. 1829, p. 125.

Therapon Günther, Cat. Brit. Mus. I. 1859, p. 274.

Mesopristes Bleeker, Bijdrage Geneesk. Topographie v. Batavia, Nat. & Geneesk. Arch. Ned. Indië, II. 1845, p. 527. — Syst. Perc. revis. Arch. néerl. Sc. Nat. XI. 1876, p. 267.

Therapon subgen. Datnia Bleeker, Atl. ichth. VII. 1873—76, p. 110. — System. Percar. Arch. néerl. Sc. nat. XI. 1876, p. 267.

Autisthes de Vis, Proc. Linn. Soc. N. S. Wales IX. 1884, p. 398.

Eutherapon Fowler, Journ. Acad. Nat. Sci. Philadelphia (2) XII. 1904, p. 527, (Therapon theraps C. V.).

Body oblong or ovate, more or less compressed, covered by small or moderate, ciliated scales. Lateral line continuous, arched, continued on basal part of caudal, the sensory scales smaller than the other scales, with a simple tube, not extending to hindborder of scale. Head large. Gape of mouth moderate, oblique; jaws equal or the upper the longer; the lips normal or fleshy. Nostrils approximate, nearly touching each other or distant and their distance about equal to greatest length of oval or triangular posterior nostrils. Six branchiostegals; gill-membranes separate, free from isthmus or nearly so; gillrakers short and stout, not numerous. Teeth in jaws in villiform bands, the outer series enlarged; on vomer and palatines present,

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[1] *Terapon* Cuvier, Lapsus calami or misprint for Therapon.

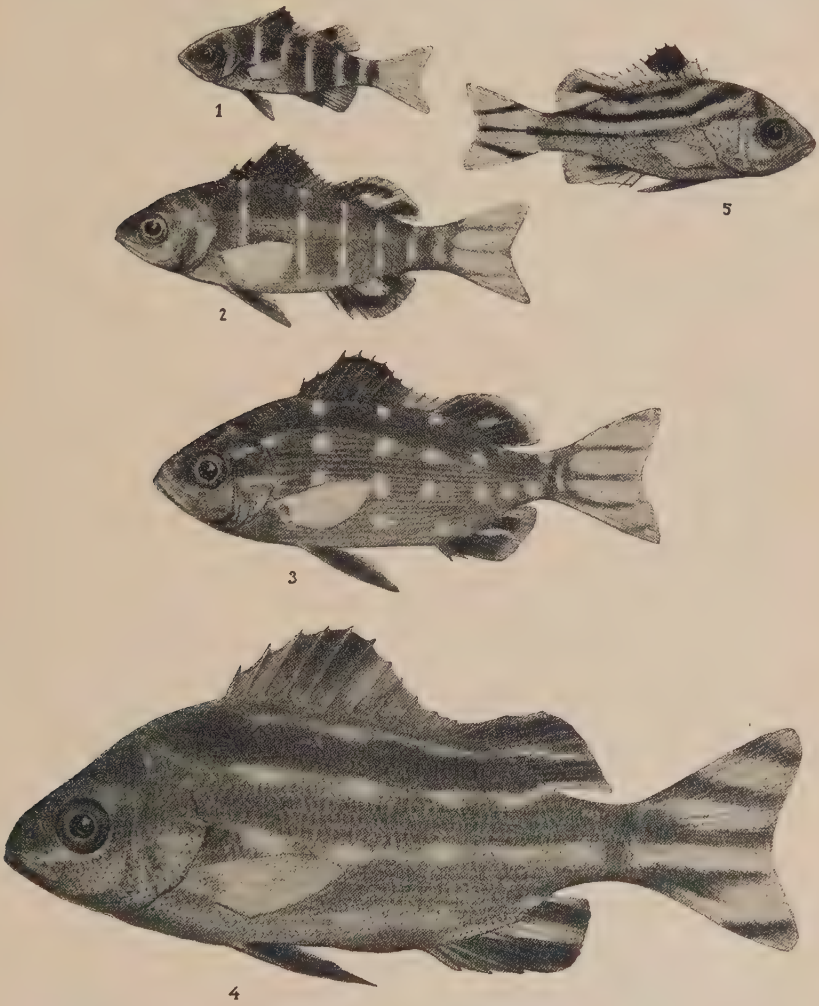

Fig. 26. Fig. 1, 2, 3, 4 Four phases in the change of the colouration of *Therapon theraps* C. V. Fig. 5. *Therapon jarbua* (Forsk). All the figures × 2. After M. Weber.

deciduous or wanting. Dorsal emarginate in its spinous portion, the ultimate spine being longer than the penultimate, or the spines decreasing in size posteriorly, the two ultimate ones being subequal or the ultimate shorter, the spines numbering XII—XIII, in one species occasionally only XI, the first being obsolete or lacking; soft portion with 8—13 rays. Anal with III spines, the first the shortest, the second and third subequal, or the second much stronger and longer than the third. Both fins with a basal scaly sheath. Caudal usually more or less emarginate. Body usually with dark stripes, at least in young, getting more or less obsolete in old specimens. For other characters see those of the family.

Distribution: as indicated for the family.

Key to the indo-australian species of Therapon.

I. Spinous dorsal emarginate, the penultimate spine much shorter than the ultimate; lower opercular spine strong, enlarged, produced beyond opercular lobe. Jaws equal. Second and third anal spine equal or subequal. Lobes of caudal with 2 oblique dark bars. Spinous dorsal with a large dark blotch.

  1. Praeoperculum denticulated, with enlarged strong angular spines. Nostrils distant. Vomer and palatines edentulous. Supralateral scales below spinous dorsal 10—13. L.l. ca. 90—95. Two to four straight dark longitudinal bands . . . . 1. *Th. puta* p. 143.

  2. Praeoperculum serrate, serrations pretty even, at angle not or only moderately enlarged. Nostrils approximate, separated by the distance of their own length.

    a. Supralateral scales below spinous dorsal 7—8. L. l. ca. 53—55. Vomer and palatines edentulous. Three to four straight dark longitudinal bands on body . . . . . 2. *Th. theraps* p. 145.

    b. Supralateral scales below spinous dorsal about 14—15. L.l. 80—90. Vomer and palatines toothed; the teeth deciduous in old age. Three dark, downward curved longitudinal bands . . . . 3. *Th. jarbua* p. 147.

II. Spinous dorsal not emarginate, the spines gradually decreasing in length, penultimate and ultimate spines equal or the ultimate the shortest. Opercular spines moderate or feeble, the lower not produced beyond the opercular lobe. Jaws equal or usually the upper the longest. Spinous dorsal without a large dark blotch. Vomerine teeth rudimentary or none; palatines edentulous.

1. D. XII; upper jaw the longest; coracoid and suprascapulare exposed, denticulate.
    - *a.* Snout pointed; profile of head concave before eyes. Lips normal; maxillary not reaching eye; nostrils far distant; soft dorsal convex; body with longitudinal bands only, getting obsolete . . . . 4. *Th. argenteus* p. 150.
    - *b.* Snout convex; profile of head convex before eyes. Lips fleshy, upper lip in old specimens with a prominent fleshy tip; maxillary reaching at least to below front-border of eye; nostrils approximate; soft dorsal more or less concave. Besides with longitudinal bands, body also with transverse ones from back to below lateral line, both getting obsolete . . . . . . 5. *Th. cancellatus* p. 151.
2. D. XIII. Jaws equal or the upper the longest: suprascapulare hidden or exposed.
    - *a.* Suprascapulare hidden below skin and scales. Upper jaw longest.

α. D. XIII. 10; A. III. 8; lateral line 38—42; supralateral scales 5; second and third anal spines nearly equal . . . . 6. *Th. micracanthus* p. 153.

β. D. XIII. 8—9; A. III. 8; lateral line 54; supralateral scales 6—$7^{1}/_{2}$; second anal spine longer than third . . . . 7. *Th. caudavittatus* p. 154.

γ. D. XIII. 12 (abnormally XII. 13); A. III. 10; lateral line 54—56; supralateral scales 10; second anal spine much longer and stronger than third . . . . 8. *Th. habbemai* p. 155.

- *b.* Suprascapulare exposed, denticulate. Jaws equal. D. XIII. 11—13; A. III. 10; lateral line 47—50; supralateral scales $6^{1}/_{2}$—$7^{1}/_{2}$; second anal spine slightly longer than third . . . . 9. *Th. trimaculatus* p. 157.

Doubtful species

10. *Th. plumbeus* p. 158.
11. *Th. oxyrhynchus* p. 159.

1. Therapon puta C. V.

Therapon puta Cuvier & Valenciennes, Hist. Nat. Poiss. III. 1829, p. 131.
Therapon ghebul Cuvier & Valenciennes, l. c. p. 133.
Therapon puta Cuvier, Règne Anim. Poiss. 1836, p. 43.
Therapon puta Bleeker, Percoïden, Verh. Bat. Gen. XXII. 1849, p. 50.
Therapon ghebul Bleeker, l. c. p. 51.

Therapon trivittatus Günther, Cat. Brit. Mus. I. 1859, p. 281 (not *Coius trivittatus* Ham. Buch. fide Day).
Therapon ghebul Günther, ibidem.
Therapon trivittatus Kner, Novara-Exp. Fische 1865—67, p. 45.
Therapon ghebul Klunzinger, Abh. zool. bot. Ges. Wien XX. 1870, p. 728.
Therapon (Datnia) trivittatus Bleeker, Révis. Therap. Ned. Tijdschrift Dierk. IV. (1872) 1873, p. 375. — Atl. ichth. VII. Tab. 340, Perc. tab. LXII. Fig. 2.
Therapon (Datnia) puta Bleeker, Atl. ichth. VII. 1873—1876, p. 112.
Therapon puta Day, Fish. India 4⁰, 1878—1888, p. 68.
Therapon trivittatus Macleay, Descr. Cat. Austral. fish. I. 1881, p. 61.
Autisthes argenteus de Vis, Proc. Linn. Soc. N. S. Wales IX. 1884, p. 398.
Therapon puta Klunzinger, Fische Roth. Meer I. 1884, p. 26.
Terapon puta Jordan & Seale, Bull. Bur. Fish. XXVI. (1906) 1907, p. 24.
Terapon puta Evermann & Seale, l. c. p. 83.
Therapon puta M. Weber, Siboga-Exp. Fische, Leiden, 1913, p. 256.
Therapon puta Ogilby & McCulloch, Mem. Queensl. Mus. V. 1916, p. 103.
Therapon puta Chaudhuri, Mem. Indian Mus. V. 1923, p. 720.
Therapon puta Fowler Fish. Oceania, Mem. Bishop Mus. X, 1928, p. 211.

D. XII. 10; A. III. 9; P. 14; V. I. 5; L.l. ca. 90—95.

Elongate, height 3.3 to nearly 4 in length; head 3.2—3.6, with the rostro-dorsal profile nearly straight, its vertex with bony ridges. Eye 3.2—3.7 in head, its diameter somewhat longer than or equal to length of snout and interorbital space. Nostrils distant, their distance longer than their own length. Praeorbital inconspicuously serrate. Jaws equal; maxillary reaching to about frontborder of eye. Praeoperculum on the short posterior margin with 5 to 6 spines, increasing in size downward, the two inferior at the rounded angle strong and enlarged, lower limb with small denticles; operculum with 2 spines, the lower much the longer, produced beyond the opercular lobe. Coracoid and exposed suprascapular bone moderately denticulate. About 10—13 scales between lateral line and middle of spinous dorsal. Teeth in jaws in villiform bands, the outer series enlarged, none on vomer and palatines. Spinous portion of dorsal deeply notched, the penultimate spine much shorter than the ultimate; all the spines rather slender, the 4th to 6th the longest; the fifth nearly equal to or longer than first ray, which is the longest of the soft portion, and which is angulate posteriorly and has the margin nearly straight. Anal with the second and third spine subequal. Both fins with a low scaly sheath. Caudal emarginate with acute lobes. Pectorals and ventrals acute. Colour grayish green or brownish above, lighter below; 4 nearly straight longitudinal dark stripes along the sides of the body: the first, which may be wanting, runs along base of spinous dorsal, commencing somewhat before it; the second from eye to end of dorsal; the third from snout through eye to caudal, continued to its hindborder; the fourth, which may be absent, from below eye or from pectoral nearly to base of caudal or to lower part of caudal peduncle. Caudal with 2 oblique bars on the lobes. Usually a dark blotch between third to seventh dorsal spine, an other on fronttop of soft dorsal. Length 165 mm.

Nom. indig.: Djampian, Kerong-Kerong (Mal.).

Habitat: Singapore; Pinang; Bintang; Banka; Riouw Arch.; Java (Batavia, Bantam); Borneo (Sandakan); Celebes (Makassar, Badjoa); Ternate; Waigeu!; Kei Islands!. — Red Sea, Sokotra, South Arabia, Zanzibar, Madagascar, Orissa, Chilka Lake, Ceylon, Philippines, Tonkin, Torres Strait, Queensland, New Britain. — In sea and brackish water.

2. **Therapon theraps** C. V. [Fig. 26, 1—4, p. 141].

Therapon theraps Cuvier & Valenciennes, Hist. nat. Poiss. III. 1829, p. 129.
Therapon obscurus Cuvier & Valenciennes, l. c. p. 135.
Therapon squalidus Cuvier & Valenciennes, l. c. p. 136.
Therapon transversus Cuvier & Valenciennes, l. c. p. 137.
Therapon cinereus Cuvier & Valenciennes, l. c. p. 138.
? *Datnia virgata* Cuvier & Valenciennes, o. c. VII. 1830, p. 480.
Therapon theraps Richardson, Ann. & Mag. Nat. Hist. IX. 1842, p. 127.
Therapon rubricatus Richardson, l. c. p. 128.
Therapon theraps Bleeker, Percoïden, Verh. Batav. Gen. XXII. 1849, p. 50.
Therapon obscurus Bleeker, l. c. p. 51.
Therapon obscurus Cantor, Journ. Asiat. Soc. Bengal XVIII. 1850, p. 1002.
Datnia virgata Rüppell, Samml. d. Senckenberg. Mus. 1852, p. 4.
Therapon theraps Kner, Novara-Exp. Fische, 1865—67, p. 44.
Therapon theraps Klunzinger, Abh. zool. bot. Ges. Wien XX. 1870, p. 728.
Therapon (*Datnia*) *theraps* Bleeker, Ned. Tijdschr. Dierk. IV. (1872) 1873, p. 379.
Therapon theraps Günther, Südsee-Fische I. 1873—1875, p. 26.
Therapon (*Datnia*) *theraps* Bleeker, Atl. ichth. VII. 1873—1876, p. 113.
Therapon theraps Day, Fish. of India 4^0, 1878—1888, p. 70.
Therapon nigripinnis Macleay, Descr. Cat. Austr. Fish. I. 1881, p. 66.
Therapon theraps Klunzinger, Fische Roth. Meer. 1884, p. 26.
Therapon theraps Jordan & Seale, Bull. Bureau fish. XXVI. (1906) 1907, p. 24.
Therapon theraps Evermann & Seale, l. c. p. 83.
Therapon theraps M. Weber, Siboga-Exp. Fische, Leiden, 1913, p. 255.
Therapon theraps Ogilby & McCulloch, Mem. Queensl. Mus. V. 1916, p. 102.
Therapon theraps Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 466.
Therapon theraps Vinciguerra, Ann. Mus. Civ. Genova L, 1926, p. 54.
Therapon theraps Duncker & Mohr, Mitt. Zool. Staatsinst. Mus. Hamburg, 44, 1929, p. 64.
Therapon theraps Fowler, Fis. Oceania, Mem. Bishop Mus. X, 1928, p. 210.

D. XII. 10; A. III. 8; P. 14; V. I. 5; L.l. ca. 53—55.

Height 2.5 to about 3 in length; head 3 to 3.5, its profile convex on snout, fartheron steep to dorsal; vertex with bony ridges and rugae. Eye 3 to 3.5 in head, about equal to blunt snout, its diameter equal to or a little greater than rough interorbital space. Nostrils approximate, separated by the distance of their own length, the anterior smaller than the posterior triangular one. Praeorbital slightly serrate. Jaws equal, maxillary extending to below anterior part of eye. Praeoperculum moderately but evenly serrate, somewhat stronger at the rounded angle; operculum with 2 spines, the lower much the longest, produced beyond the opercular lobe. Coracoid dentate; suprascapular bone exposed, strongly denticulate. Gillrakers short about 12 on lower limb of first arch. About 7—8 scales between lateral line and spinous dorsal. Teeth in jaws in villiform bands, the outer series enlarged, lacking teeth on vomer and palatines. Dorsal deeply notched in its spinous portion, the penultimate spine being much shorter than the ultimate and the 3rd to 5th the longest, higher than the soft portion, which is angulate and has a straight or emarginate margin. Anal with the third spine usually longer than the second, its margin somewhat emarginate or straight. Both fins with a low scaly sheath. Caudal somewhat emarginate with 15 divided rays and prominent lobes. Pectorals and ventrals acute, about equal to head without snout; first ray of ventrals with a short filament not reaching vent. Colour more or less dusky above, silvery below, with 3 to 4 longitudinal brownish broad bands; the upper covers a part of the nape and the back and may be confluent in younger specimens with the second, which extends from the eye to the upper half of the caudal peduncle; the third from eye to caudal continued to margin of that fin; the fourth from pectoral to caudal may be wanting in adult. Caudal with 2 oblique bands on both lobes. A large blackish blotch between third and seventh dorsal spine; soft dorsal with 2 dark blotches [1]). Length 195 mm.

Nom. indig.: Kerrong, Djambron, Krot-krot (Mal.).

Habitat: Singapore; Pinang; Sumatra (Atjeh, Trussan,

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[1]) The evolution of colouration is described by one of us (Siboga-Exp. Fische, Leiden 1913, p. 255) and by Duncker & Mohr (Mitt. Zool. Staatsinst. und Mus. Hamburg 44, 1929, p. 64).

Padang, Tiku, Priaman); Simalur!; Nias; Banka; Java (Batavia!, Tandjong Priok!, Anjer, Tjeringin, Bantam, Cheribon!, Tegal, Tanara, Japara, Karangbollong, Patjitan, Samarang!, Prigi, Surabaya); Madura; Kangeang Island!; Bali; Sumbawa; Rotti!; Timor!; Solor; Borneo (Sinkawang, Balik-Papan Bay!, River Kapuas); Celebes (Makassar!, Menado); Buton-Strait!; Buru; Ambon; Halmaheira!; Batjan; Obi major; Aru Islands!; New Guinea (Etna Bay!, River Mimika!). — Red Sea, Zanzibar, South Africa, Madagascar, Bay of Bengal, British India, Andamans, Siam, Philippines, Formosa, China, Australia, Yap Island, Carolines, Palm Island to Flinder's Island, Polynesian Islands. — In sea, brackish water, entering rivers.

3. **Therapon jarbua** (Forsk.) [Fig. 26, 5. p. 141].

Sciaena jarbua Forskål, Descr. Animal., 1775, p. 50.
Holocentrus servus Bloch, Ausl. Fische IV. 1797, p. 80.
Grammistes servus Bloch, Schneider, Syst. Ichth., 1801, p. 185.
Coius trivittatus Hamilton Buchanan, Fish. Ganges, 1822, p. 92, 370 [1]).
Terapon timoriensis Quoy & Gaimard, Voy. Uranie & Physic. 1824, p. 341.
Therapon servus Cuvier & Valenciennes, Hist. nat. Poiss. III. 1829, p. 125. — o. c. VII. 1831, p. 479.
Pterapon trivittatus (*sic.*) Richardson, Ann. & Mag. Nat. Hist. IX. 1842, p. 128.
Therapon trivittatus Cantor, Journ. Asiat. Soc. Bengal XVIII. 1850, p. 1001 (nec Günther).
Therapon servus Günther, Cat. Brit. Mus. I. 1859, p. 278.
Therapon servus Kner, Reise Novara, Fische, 1865—67 p. 45.
Therapon jarbua Klunzinger, Abh. Zool. bot. Ges. Wien XX. 1870, p. 729.
Therapon (*Datnia*) *jarbua* Bleeker, Ned. Tijdschr. Dierk. IV. 1873, p. 377. — Atl. ichth. VII. 1873—1876, p. 112.
Therapon jarbua Day, Fish. India 4⁰, 1878—1888, p. 69.
Therapon servus Macleay, Descr. Cat. Austr. Fish. I. 1881, p. 61.
Therapon jarbua Klunzinger, Fische Roth. Meer. 1884, p. 26.
Therapon jarbua Jordan & Evermann, Proc. U. S. Nat. Mus. XXV. 1902, p. 348.
Terapon jarbua Jordan & Seale, Bull. Bureau fish. XXV. 1906, p. 266. — l. c. XXVI. (1906) 1907, p. 23.
Therapon jarbua Gilchrist & Thompson, Ann. South Afric. Mus. VI. 1908, p. 150.
Therapon servus Jordan & Thompson, Proc. U. S. Nat. Mus. 41, 1912, p. 536.
Therapon jarbua M. Weber, Siboga-Exped. Fische, Leiden 1913, p. 254.
Therapon jarbua Boulenger, Cat. Freshwat. Fish. Africa 1915, p. 113.
Therapon servus Ogilby & McCulloch, Mem. Queens. Mus. V. 1916, p. 104.
Therapon servus McCulloch, Biol. Results Fishing Exper. „Endeavour" IV, 1916, p. 182.
Therapon jarbua Fowler & Bean, Proc. U. S. Nat. Mus. 62, 1922, p. 32.

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1) According to Day l. c. p. 70, this is a synonym of *Th. jarbua* not of *Th. puta*.

Therapon jarbua Chaudhuri, Mem. Indian Mus. V. 1923, p. 719.
Therapon jarbua Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 467.
Therapon jarbua Fowler, Fish. Oceania, Mem. Bishop Mus. X, 1928, p. 211.
Therapon jarbua Duncker & Mohr, Mitt. Zool. Mus. Hamburg, 44, 1929, p. 62.

D. XI—XII. 10; A. III. 8—9; P. 13; V. I. 5; L.l. 80—90. Height 2.6 to about 3 in length; head 3 to 3.6, its rostrodorsal profile somewhat arched, the blunt snout being somewhat convex, the strongly ridged vertex running nearly straight to dorsal. Eye about 3.5 to 4 in head (without opercular spine), about equal to flat interorbital space, its diameter subequal to or somewhat longer than snout. Nostrils approximate, separated about by the distance of their own length, the anterior valvular, smaller than the posterior triangular one. Praeorbital conspicuously serrated. Jaws equal; maxillary reaching to below pupil. Praeoperculum serrate, strongest at its rounded angle, which in youth is provided with 2 strong spines of about half length of eye, while the upper hindborder is still entire. Operculum with 2 spines, the upper obsolete, the lower enlarged, produced beyond the opercular lobe. Coracoid with 5 coarse teeth; suprascapular bone exposed, finely serrate. Gillrakers short, stout 8 + 13 or 7 + 14. About 14—15 transverse scales above lateral line. Teeth in jaws in villiform bands, an outer series enlarged, conical, in slender row on vomer and palatines, deciduous, in old specimens wanting. Dorsal deeply notched, the penultimate spine shorter than the ultimate; the first spine small, rudimentary or in some races even wanting, accordingly 11 or 12 spines present; third to fifth or fourth to sixth spines the longest, much higher than soft-rayed portion which is angulate behind, its margin straight or somewhat emarginate. Anal with the second and third spine subequal, the soft portion with its margin more or less emarginate. Both fins with a low scaly sheath. Anal deeply concave, with 15 divided rays. Pectorals short, asymmetrically rounded, less than twice in head; ventrals acute, one and a half in head. Colour brownish-gray above, silvery below; three dark longitudinal, downward curved bands, the first from origin of dorsal to anterior rays, the second from nape to upper surface of caudal peduncle, the third, the narrowest, from occiput to middle of caudal peduncle, continued on caudal, which has beside above and below an oblique blackish bar and the upper lobe tipped with black. Between fourth and eighth dorsal spine a large black blotch; margin of soft dorsal with two or three dusky spots[1]. Length 252 mm.

Nom. indig. Korrong-korrong, Djambron, Krot-Krot (Mal.); Errong-errong (Javan.); Longkerong (Madura); Godida, Kerrong-Kerrong (Batjan); Babaguni (Menado).

Habitat: Singapore; Pinang; Sumatra (Sabang!, Benkulen, Trussan, Padang, Priaman, Tiku, Siboga); Nias!; Simalur (Lasikin!, Sinabang Bay!, Labuan Badjan!); Batu Islands; Bintang; Banka; Biliton; Lepar; Natuna; Java (Anjer, Bantam, Batavia, Cheribon!, Tegal, Samarang!, Rembang, Surabaya, Pasuruan, Banjuwangi, Panarukan!, Patjitan); Duizend Islands; Bawean; Madura; Kangeang Island; Bali; Lombok!; Sumbawa!; Flores!; Borneo (Sampit, Baram-River, Sandakan); Celebes (Makassar!, Bonthain, Badjoa, Bulukomba, Tanette!, Dongala!, Lagusi, Menado, Tombariri); Saleyer!; Buton!; Timor!; Roma!; Ternate; Batjan; Obi major; Ceram!; Ambon!; Goram; Aru Islands!; Kei Islands!; New Guinea (Doreh, Merauke River!, River Siko!, Mbai River!, Langenrak Bay). — Red Sea, East Africa (Zanzibar, Beira!), Madagascar, Mauritius, Seychelles, Akyab, Muscat, Chilka Lake, Madras, Ceylon, Praslin, Philippines, Formosa, China, Japan, Riu Kiu Islands, Australia, Lord Howe Island, New Caledonia, New Britannia, Neu-Pommern, Samoa, Fiji Islands, Tonga Islands, Solomon Islands, Admirality Islands. — In sea, brackish water and rivers.

Note: Jordan & Thompson (Proc. U. S. Nat. Mus. XLI. 1912, p. 537) suggest that probably two species are to be distinguished: one corresponding to the Arabian specimens described by Forskål as *Sciaena jarbua* and distributed over the indo-australian Archipelago, the Philippines and Samoa; the other corresponding to *Holocentrus servus* Bloch, described by Bloch from Japan, and also found in China and Formosa. Jordan & Thompson mention some characters in which *Therapon jarbua* (Forskål 1775) and *Th. servus* (Bloch 1797) seem to be distinct and Ogilby & McCulloch (l. s. c.) are not alien to a similar supposition, repeated by McCulloch (Biol. Res. „Endeavour" IV, 1916, p. 182); but we are not sure, that they are not without transition and prefer to retain the single species *Th. jarbua* (Forsk.), which is indeed variable in its colouration, in its scale-counts, in the size of the eye, in the preopercular serration.

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[1] The evolution of colouration is treated by Duncker & Mohr (Mitt. a. d. Zool. Staatsinst. und Museum Hamburg 44, 1929, p. 63).

4. **Therapon argenteus** (C. V.).

Datnia argentea Cuvier & Valenciennes, Hist. nat. Poiss. III. 1829, p. 139.
Mesopristes macracanthus Bleeker, Nat. & Geneesk. Arch. Ned. Indië II. 1844, p. 523.
Datnia argentea Bleeker, Verh. Batav. Gen. XXII. 1849, p. 52.
Datnia cancellatoides Bleeker, Nat. Tijdschr. Ned. Ind. IV. 1853, p. 247.
Therapon argenteus Günther, Cat. Brit. Mus. I. 1859, p. 283.
Therapon (Datnia) argenteus Bleeker, Ned. Tijdschr. Dierk. IV. (1872) 1873, p. 382.
Therapon (Datnia) argenteus Bleeker, Atl. ichth. VII. 1873—76, p. 114.
Datnia argentea Day, Fish. India 4⁰, 1878—88, p. 71.
Therapon nasutus Macleay, Proc. Linn. Soc. N. S. Wales VIII. 1883, p. 258.
Therapon chalybeus Macleay, l. c. p. 259.
Therapon acutirostris de Vis, Proc. Linn. Soc. N. S. Wales IX. 1884, p. 398.
Therapon argenteus M. Weber, Zool. Ergebn. Reise Niederl. Ind. III. 1894, p. 407.
Therapon (Datnia) argenteus Ogilby & McCulloch, Mem. Queensl. Mus. V. 1916, p. 115.
Therapon argenteus Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 468.
Therapon argenteus Fowler, Fish. Oceania, Mem. Bishop Mus. X, 1928, p. 212.

D. XII. 10; A. III. 8—9; P. 12—14; V. I. 5; L.l. 56—58.

Height 2.5—2.7 in length. Head 2.7 to 3, pointed, its profile concave to nape, furtheron somewhat convex to dorsal; occiput with bony ridges, obsolete in adult. Eye 3 to 3.5 in head, its diameter greater than interorbital space, but shorter or much shorter than pointed snout. Nostrils far distant. Praeorbital serrated. Upper jaw sligthly the longer, reaching front-border of eye in young, not in old specimens. Praeoperculum denticulated, the denticles somewhat enlarged at the rounded angle, more so in young. Operculum with two flat spines, the lower not surpassing the opercular lobe. Coracoid and supra-scapular bone exposed and denticulated. About 8—10 scales between lateral line and middle of spinous dorsal. Teeth in jaws in villiform bands, the outer series enlarged, none on vomer and palatines. Dorsal spines heteracanth, strong, eleventh and twelfth spines subequal, the fourth to sixth the longest, but less than half height of body, more in young, higher than soft dorsal, which is obtusely rounded. Anal with three strong spines, the second much longer and stronger than the third, longer than soft-rayed portion, which is angulate and equals height of soft dorsal. Both fins with a basal scaly sheath. Caudal emarginate with 15 divided rays. Pectorals acutely rounded, about equal to head without snout. Ventrals of similar size. Colour uniform dusky greenish, lighter below, with a silvery hue; in the young, below about 80 mm. to ample 100 mm. length, with 4—5 dark longitudinal stripes: the first curved parallel to profile of back, somewhat below base of dorsal; the second slightly curved running from upper border of eye to superior border of caudal peduncle; the third straight, from snout through eye to base of caudal; the fourth from maxillary to ventral border of caudal peduncle or lower base of caudal; there may be a faint fifth below pectoral; they disappear while growing [1]). Length 275 mm.

Nom. indig.: Krot-krot (Mal.); Otottoh (Javan.); Mangahua (South Celebes); Tindano (Central Celebes).

Habitat: Nias!; Simalur!; Sumatra (Telokbetong, Benkulen, Priaman); Java (Batavia, Pasuruan); Celebes (Makassar!, Amparang river near Balangnipa!, Central Celebes!); Ambon!; Saparua!; Island Haruku; Ceram!. — Philippines, China, Neu-Pommern, Queensland, Fiji, New Hebrides, D'Entrecasteaux Islands. The localities „Cape seas" and British India are erroneous. — In sea, brackish water, entering rivers.

5. **Therapon cancellatus** (C. V.) [Fig. 27. p. 152].

Datnia cancellata Cuvier & Valenciennes, Hist. nat. Poiss. III. 1829, p. 144.
Datnia cancellata Bleeker, Nat. Tijdschr. Ned. Indië VIII. 1855, p. 438.
Therapon cancellatus Günther, Cat. Brit. Mus. I. 1859, p. 276.
Datnia cancellata Bleeker, Fauna Celebes p. 24 Acta Soc. Sc. Indo-Neerl. VIII. 1860.
Datnia Rosenbergi Bleeker, Nat. Tijdschr. Ned. Indië XXII. 1860, p. 253.
Therapon (Datnia) cancellatus Bleeker, Révis. Therapon. Ned. Tijdschr. Dierk. IV. (1872) 1873, p. 385.
Therapon (Datnia) Rosenbergi Bleeker, l. c. p. 387.
Therapon (Datnia) cancellatus Bleeker, Atl. ichth. VII. 1873—76, p. 116.
Therapon (Datnia) Rosenbergi Bleeker, ibidem.
Therapon interruptus Macleay, Proc. Linn. Soc. N. S. Wales VIII. 1883, p. 258.
Therapon cancellatus M. Weber in Semon, Zool. Forsch. Reise, V. 1895, p. 262.
Therapon cancellatus M. Weber & de Beaufort, Versl. Akad. Amsterdam 1912, p. 135.
Therapon rosenbergi de Beaufort, Bijdr. tot de Dierk. 1913, p. 118.
Therapon (Datnia) interruptus Ogilby & McCulloch, Mem. Queensl. Mus. V. 1916, p. 114.
Therapon interruptus Fowler, Fish. Oceania, Mem. Bishop Mus. X, 1928, p. 211.

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[1]) The young striped specimens were in 1853 described by Bleeker as *Datnia cancellatoides*.

D. XII. 10; A. III. 8; P. 13—14; V. I. 5; L.l. 53.

Height about 2.5—3 in length; head 2.8—3.2, its profile somewhat convex before eyes, the occiput nearly smooth. Eye 3.5—4 in head, its diameter equal to or, in older specimens shorter than the interorbital space; in young equal to, later $1^1/_2$ times in length of convex snout which has an acute tip. Lips thick, the upper one without fleshy point in young, but in old specimens very fleshy and much produced. Nostrils approximate, nearly touching each other. Praeorbital evidently serrated. Upper jaw the longest, reaching to below frontborder of eye. Praeoperculum entire below, its hindborder serrated, stronger and more spinelike in young, at the somewhat rounded angle. Operculum with two flat spines, the lower much longer, but not surpassing the opercular lobe. Coracoid and suprascapular bone exposed and conspicuously dentate. Six to seven and a half scales between lateral line and middle of spinous dorsal. About 16—18 long and slender gillrakers on lower limb of first branchial arch. Teeth in jaws in villiform bands, the outer series enlarged, none on vomer and palatines. Dorsal spines rather strong, the fifth the longest, about twice in height of body and about equal to first dorsal ray, which goes 1,8—2 in length of head, the two ultimate spines subequal, longer than half length of first ray. Soft dorsal strongly decreasing in height, acute, its border concave. Second spine of anal

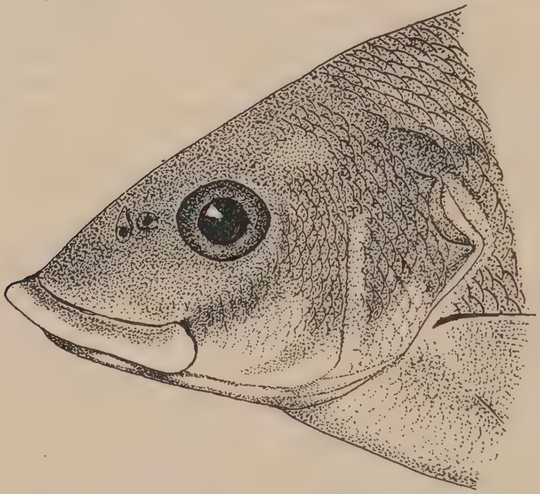

Fig. 27. *Therapon cancellatus* (C. V.); nat. size.

much longer and stronger than third, nearly twice longer than eye; soft anal angulate, its border straight or slightly concave. Both fins with a scaly basal sheath. Caudal emarginate, with 15 divided rays. Pectorals somewhat shorter than head; ventrals acute, their first ray surpassing anus. Colour in alcohol dusky greenish or brownish, lighter below, with a silvery hue. A faint longitudinal band in the lateral line; below it three more accentuated longitudinal dark bands; the two lower ones more or less broken up into longitudinal blotches. They get obsolete or disappear in old specimens. This is also the case with four to five faint dusky crossbands, descending from back to below lateral line, crossing the longitudinal bands; a black spot on basal frontpart of anal. Length over 215 mm.

Habitat: Java (Tjilankahan); Celebes (Menado, Klabatdiatas); Batjan!; Ceram (River Ruwata); Ambon (in sea and rivers)!; Timor!; North and South New Guinea. — Philippines (Mindoro Island), Formosa, Normanby Island, D'Entrecasteaux Group. — In sea, brackish water and in rivers far from sea.

6. **Therapon micracanthus** (Blkr.)

Datnia micracanthus Bleeker, Dertiende Bijdr. Vischfauna Celebes, Acta Soc. Scient. Indo-Neerl. VIII. 1860, p. 55.

Therapon (Datnia) micracanthus Bleeker, Révis. Theraponid. Ned. Tijdschr. Dierk. IV. (1872), 1873, p. 388. — Atl. ichth. VII. 1873—76, p. 117.

Therapon micracanthus M. Weber, Zool. Ergebn. Reise Niederl. Ost-Indien III. 1894, p. 408.

D. XIII. 10; A. III. 8; P. 15; V. I. 5; L.l. 38—42.

Height 2.3—2.5 in length; head 3 or slightly more in length, its occiput nearly smooth, its rostro-dorsal profile slightly convex. Eye 2.75—3 in head, its diameter longer than interorbital space and longer than convex snout. Lips not fleshy. Nostrils distant. Praeorbital with nearly inconspicuous denticulation. Upper jaw slightly longer than the lower, nearly reaching vertical through frontborder of eye or even to below its frontborder. Hindborder of praeoperculum and its rounded angle rough by weak denticulation. Operculum with two flat weak spines, the lower one slightly longer. Coracoid exposed, with small denticulations; suprascapular hidden by scales. Five scales between lateral line and middle of spinous dorsal. Teeth in jaws in villiform bands, the outer series enlarged; none on vomer and palatines. Spinous portion of dorsal higher than soft portion, the spines heteracanth, rather strong, the fifth to seventh the longest, somewhat shorter than half depth of body, the two ultimate subequal, about $^3/_4$ the length of the first ray of soft dorsal, which has in adult a straight border, posteriorly angulate. Second and third anal spine nearly equal in size and length, much longer than eye. Both fins with a basal scaly sheath. Caudal slightly emarginate, with 15 divided rays. Pectorals acutely rounded; ventrals acute, their length somewhat more than head without snout. Colour dusky-greenish above, silvery below, four longitudinal dark bands: the first along base of dorsal; the second from nape to upper border of caudal peduncle; the third from upper corner of gillopening running parallel to second; the fourth from opercle to base of caudal; besides there are some faint bands from axil of pectoral, running below lateral line, disappearing in older specimens; this is also the case with two transverse bands on base of caudal, the lobes of which are dark brown. Length 115 mm.

Nom. indig.: Bale tjonki (Celebes, Tempe).

Habitat: Celebes (River Lagusi, River Amparang near Balangnipa!, River Minralang near Tempe!, River Tjenrana near Pampanua!).

7. **Therapon caudavittatus** (Richardson).

Datnia? *caudavittatus* Richardson, Voy. Erebus & Terror, Fishes, 1845, p. 24.

Therapon caudovittatus Günther, Cat. Brit. Mus. I. 1859, p. 284.

Therapon caudovittatus? vel *bostockii* Castelnau, Proc. Zool. Soc. Victoria II. 1873, p. 128.

Therapon caudovittatus Macleay, Proc. Linn. Soc. N. S. Wales II. 1878, p. 348.

Therapon caudovittatus Castelnau, Proc. Linn. Soc. N. S. Wales III. 1879. p. 42, 47.

Therapon caudovittatus Klunzinger, Sitzb. Akad. Wien LXXX. 1880, p. 350.

Therapon caudovittatus Macleay, Descr. Cat. Austral. Fishes I. 1881. p. 61. — Proc. Linn. Soc. N. S. Wales VIII. 1883, p. 260.

Therapon caudavittatus Waite, Rec. Western Austral. Mus. III. 1900, p. 210.

Therapon caudavittatus McCulloch, l. c. (2) I. 1912, p. 88.

Therapon caudavittatus Ogilby & McCulloch, Mem. Queensland Mus. V. 1916, p. 108.

Therapon caudavittatus Fowler, Fish. Oceania, Mem. Bishop Mus. X, 1928, p. 211.

D. XIII. 8—9; A. III. 8; P. 14—15; V. I. 5; L.l. 54.

Depth 2.8 in length; head 3.3, ascending with an oblique profile. Interorbital ridges well developed, those of the cranium weak. Eye equal to interorbital width, 4.5 in head and 1.6

in snout. Snout rather acute, 2.7 in head. Upper jaw longest, reaching to below the nostrils or the anterior orbital margin. Praeorbital more or less serrated. Praeoperculum evenly and finely serrated. Lower opercular spine well developed, not or scarcely projecting beyond the opercular lobe. Suprascapular hidden beneath the skin and scales; coracoid denticulate. Between lateral line and middle of spinous dorsal 6—$7^1/_2$ scales. Teeth in villiform bands in jaws, the outer row a little taller than the rest, none on vomer and palatines. Fifth dorsal spine longest, 1.8 in head, higher than the rays; the last spine is shorter than the penultimate one and as long as the anterior dorsal ray which goes 2.1 in head. Dorsal spines heteracanth. Second anal spine longer than the third, 2.5 in head. Caudal shallowly emarginate. Colour (in formaline) violet grey on the back, lighter on the sides, and white below; the upper parts and the sides are closely spotted with round greyish spots. Dorsal similarly spotted, the soft portion with a blackish margin. Caudal more or less spotted basally, each lobe with a large black blotch extending obliquely across it. Length 196 mm. [After OGILBY & MCCULLOCH. Not seen by us].

Habitat: Dutch New Guinea (Gulf of Papua). — Torres Strait, Murray Island and Long Island in Torres Strait, North and Western Australia in sea and rivers.

8. **Therapon habbemai** M. Web. [Fig. 28, 29, p. 156].

Therapon Habbemai M. Weber, Notes Leyden Mus. XXXII. 1910, p. 234.
Therapon Habbemai M. Weber, Nova Guinea IX. Zoologie, livr. 4, 1913, p. 583.
Therapon habbemai Regan, Trans. Zool. Soc. London XX. Part 6, 1914, p. 276
Therapon trimaculatus Fowler, Fish. Oceania, Mem. Bishop Mus. X, 1928, p. 212 (p. p.).

D. XIII. 12 (by exception XII. 13); A. III. 10; P. 2.13; V. I. 5; L.l. 54—56.

Height 2.5—2.6 in length; head 3.1—3.2, its rostro-dorsal profile sloping down in a straight or slightly convex line. Eye in anterior half of head, 4 to 5 in head, its diameter $1^2/_3$ to $1^1/_4$ in the roundly pointed snout and nearly in flat interorbital space. Nostrils small, distant. Lips thick. Praeorbital only at its hindborder weakly denticulated. Upper jaw the longest, reaching to vertical through frontborder of eye. Praeoperculum finely serrated posteriorly till its rounded angle. Operculum with two flat spines, the lower one much stronger, not surpassing opercular lobe. Coracoid not dentate, suprascapular bone concealed below skin and scales. About 5—6 irregular rows of teeth in the jaws, the outer one somewhat stronger and regular, none on vomer, palatines and tongue. Ten scales between lateral line and middle of spinous dorsal. Spinous dorsal rounded, much higher than the rounded soft dorsal; its spines heteracanth, the first about $^4/_5$ shorter than the sixth and seventh, which are the longest; the twelfth is $^1/_3$ shorter but not much longer than the thirteenth. Second anal spine much longer and stronger than the third, about equal to length of eye and snout. Soft dorsal and anal rounded and equal to or somewhat higher than postorbital part of head. Both fins with a basal sheath of scales. Caudal only with an indication of emargination, nearly truncate, its lobes rounded. Pectorals and ventrals about equal to head

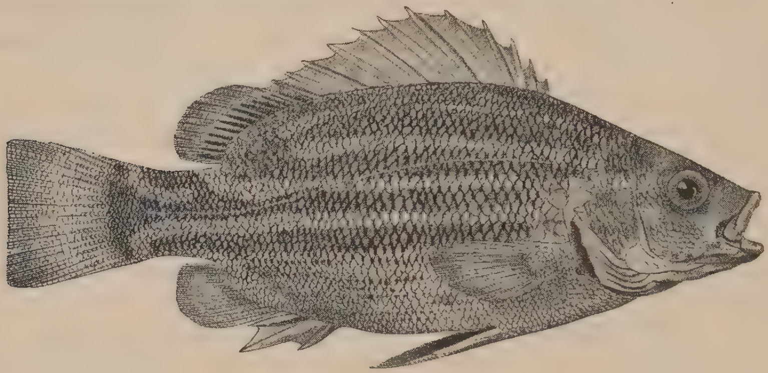

Fig. 28. *Therapon habbemai* M. Web. After M. Weber.

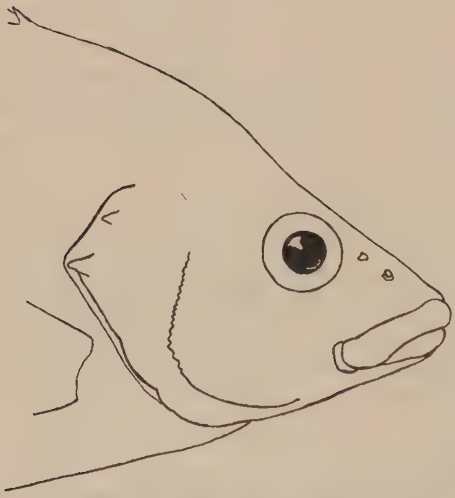

Fig. 29. *Therapon habbemai* M. Web. nat. size; After M. Weber. To show the true profile of the head, changed in fig. 28 by the open mouth and by the mode of preservation.

without snout. Colours in alcohol bluish-black on back, while young usually with 5 more or less conspicuous longitudinal bands, separated by whitish or yellowish bands of the breadth of one or one and a half scale. Lateron disappear these bands and the sides and the belly are irregularly marmorated. Soft median fins dusky, lighter in their peripherical third. Length 190 mm.

Habitat: Dutch South New Guinea (Lorentz River!, Mimika River!).

9. **Therapon trimaculatus** Macleay.

Therapon trimaculatus Macleay, Proc. Linn. Soc. N. S. Wales VIII. 1883, p. 259.
Therapon trimaculatus Ogilby & McCulloch, Mem. Queensl. Mus. V. 1916, p. 120.
Therapon trimaculatus Fowler, Fish. Oceania, Mem. Bishop Mus. X, 1928, p. 212 (p. p.).

D. XIII. 11—13; A. III. 10—11; scales above L.l. 47—50; below it 46—50.

Depth 2.2—2.5 in length, head 2.9, its upper profile almost straight to the nape where it is convex, the bony ridges of the upper surface but feebly developed. Eye 3.7—4.6 in head, 1—1.4 in snout; the interorbital space almost flat, its width slightly less than length of snout. Snout obtusely pointed, 2.8—3.7 in head. Nostrils well separated, the anterior small and tubular, the other large. Jaws equal, the maxillary reaching back to behind the vertical of the posterior nostril, or to below the anterior portion of the eye. Praeorbital entire or with some small teeth posteriorly. Praeoperculum slightly serrated; operculum with two spines, the lower strong, but not extending beyond the opercular lobe. Coracoid and suprascapula exposed, denticulate (according to figure of McCulloch). Teeth in jaws in a band, the outer ones largest, cylindrical and fixed, vomer and palatines toothless. Gillrakers of the first gill-arch rather short and thick posteriorly, about twelve on the lower limb. Dorsal spines moderately strong, the fifth the longest, but shorter than anterior rays, its length twice in head; last spine a little shorter than the penultimate one; soft dorsal rounded. Anal originating below the posterior dorsal spines and terminating slightly in advance of the soft dorsal; the spines are rather strong, the second a little longer than the third, 2.6—2.8 in head, and much shorter than the rays; soft anal rounded. Caudal emarginate. Pectorals pointed above, the hinder margin rounded; fourth or fifth upper ray longest. Ventrals inserted below origin of the dorsal in the young, farther back in adults and reaching back to the vent or the anal fin, anterior rays with a short filament. „The color-markings are indistinct in most of the specimens, and are clearly shown in only one small example. This has eight rather broad dark bands on either side, those above the lateral line following the curve of the back and being more or less confluent posteriorly, while those below it are horizontal. The median band terminates in a dark mark on the base of the caudal, above and below which are two dark rounded spots; another spot on the upper margin of the caudal peduncle. Some specimens have the outer portions of the dorsal and anal fins light-colored while the membranes of the spinous dorsal and anal bear darker markings. There is a light curved band at the base of the pectoral, and the opercular membrane is blackish posteriorly." [After OGILBY and MCCULLOCH, not seen by us].

Habitat: New Guinea (Goldie River), fresh water. — York Peninsula; Queensland; this locality is uncertain and requires verification.

Doubtful Species.

10. **Therapon plumbeus** (Kner).

Datnia plumbea Kner, Novara-Exped. Fische 1865—67, p. 48.
Therapon (*Datnia*) *plumbeus* Bleeker, Révis. Theraponid. Ned. Tijdschr. Dierk. IV. (1872) 1873, p. 383. — Atl. ichth. VII. 1873—76, p. 115.
Mesopristes plumbeus Fowler, Proc. Acad. Nat. Sci. Philadelphia LXX, 1918, p. 36.

„Longitudo totalis ad corporis altitudinem = $3^{1}/_{3}$—$^{2}/_{5}$: 1, ad capitis longitudinem = 4 : 1, frons concava, os praeorbitale latum margine dentato, praeoperculum serratum, suprascapula integra, vomer et palatum edentula; longissimi p. dorsalis aculei (4. ad 6. usque) $2^{1}/_{2}$ in corporis altitudine, p. caudalis biloba, dorsalis nigro limbata."

D. 12/9, A. 3/8 ... Squ. $\overset{8-9}{\underset{14-15}{\overline{53-54}}}$. Ap. pyl. 9.

Das Auge misst mehr als $^{1}/_{4}$ der Kopflänge, es steht 1 Diameter vom Schnauzenrande und eben so weit vom anderen Auge entfernt; der Oberkiefer reicht bis unter den vorderen Augenrand; das Präorbitale ist gross, breit, fein gezähnelt, der Vordeckel rings gesägt, zwei schwache Dornen ragen am Deckel vor, der Humerus ist bezahnt, die

Suprascapula verdeckt aber glatt. Rücken- und Afterflosse sind entschieden heteracanth, die längsten Dorsalstacheln (der vierte bis sechste) $2^1/_2$ mal in der Körperhöhe, der zweite und dritte Anale fast gleich lang und dick, stärker aber kürzer als jene, die Brustflossen kaum länger als der Stachel der Ventralen, deren Gliederstrahlen selbst nicht bis an den After reichen; die Caudale ist eingebuchtet, gleichlappig, die Schuppen sind mehrreihig ctenoid. — Einfärbig bleigrau, am Rücken dunkler; den Schuppenreihen entsprechen dunkle Längslinien, ohne dass diese wahre Binden zu nennen wären. Alle Flossen einfärbig, nur der stachelige Theil der Dorsale schwärzlich gesäumt. — Die ziemlich kurzen Blinddärme stehen in zwei Bündel zu vier und fünf; die Ovarien eines reifen Weibchens reichen bis an die vordere Abtheilung der Schwimmblase und sind von kleinen Eiern strotzend voll. — Länge des grössten der fünf Exemplare $5^1/_2$", Fundort unsicher, angeblich von Java. [After KNER, not seen by us].

Note. Bleeker remarks: „Il est fort douteux que le *plumbeus* habite les eaux de l'ile de Java, puisque je ne l'y jamais trouvé et que Kner indique lui-même que son habitat est incertain". Also in later years it has not been found in the Archipelago. But in 1918 H. W. Fowler (Proc. Acad. Nat. Sci. Philadelphia LXX. 1918, p. 36) published its occurrence in the Philippine Islands and gave a detailed description under the name of *Mesopristes plumbeus* (Kner) and united it with *Therapon brevispinis* Peters (not Steindachner), *Th. brachycentrus* Peters and with a? *Th. kneri* Bleeker.

11. **Therapon oxyrhynchus** Schlegel.

Therapon oxyrhynchus Temminck & Schlegel, Fauna Japon. 1846, p. 16.

A. B. Meyer (Anal. de la Soc. Esp. d'Hist. Nat. XIV. 1885, p. 12) in his Catalogue of fishes collected in the Indian Archipelago, records this fish from Menado, Celebes. This is certainly an error, as *Th. oxyrhynchus* is only known from China & Japan. The locality Ovalau, Fiji Islands, given by Günther (Shore Fishes, Voy. Challenger, Zoology VIII. 1883, p. 34) seems to us to be uncertain and to require verification.

2. **Pelates** Cuvier & Valenciennes.

(Cuvier & Valenciennes, Hist. nat. Poiss. III. 1829, p. 145).
Therapon subgen. *Pelates* Bleeker, Atl. ichth. VII. 1873—1876, p. 110 — System. Percarum Arch. néerl. Sc. nat. XI. 1876, p. 267.
Therapon subgen. *Pelates* Klunzinger, Fische Roth. Meer. 1884, p. 26.
Pelates Ogilby & McCulloch, Mem. Queensl. Mus. V. 1916, p. 125.

Body oblong, compressed, covered by small, ciliated scales. Lateral line complete, continued on basal part of caudal, arched, the sensory scales somewhat smaller than the scales of the body, with a simple tube extending to hindborder of scale. Gape of mouth oblique, jaws subequal, or the upper slightly longer; lips not fleshy. Nostrils distant. Praeorbital entire or finely serrate. Praeoperculum finely or coarsely serrate; operculum with two spines, the inferior stronger and longer, not surpassing opercular lobe. Coracoid denticulate, suprascapulare denticulate or entire and partly hidden by scales. Six branchiostegals; gillmembranes united, nearly free from isthmus; gillrakers rather numerous, lanceolate, of moderate length. Teeth in old specimens in upper jaw in three, in lower in two more or less regular rows, the outer row much enlarged, brown or at least browntipped, conical or flattened with a conical point; none on vomer and palatines. A continuous dorsal, its spinous portion arched with XII spines, the middle ones being the highest, the two ultimate subequal, much shorter than the soft dorsal, which has 10—13 rays. Anal with 3 spines, second and third subequal or the second stronger and longer than the third, soft anal with 9—10 rays. Both fins with a scaly basal sheath. Caudal more or less deeply

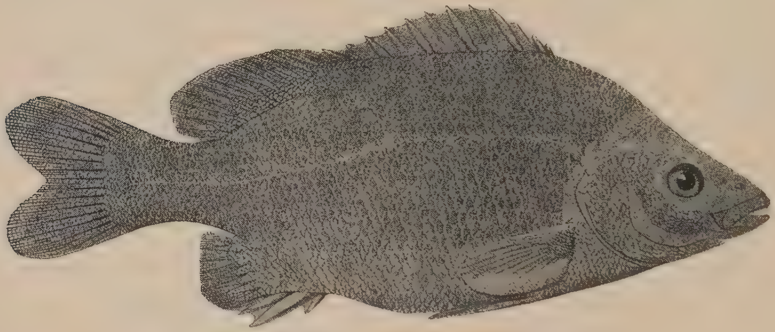

Fig. 30. *Pelates römeri* M. Web. After M. Weber.

emarginate, with 15 divided rays. Pectorals asymmetrically rounded; below their middle originate the ventrals with a moderate spine and 5 rays, reaching vent or nearly so.

Distribution: A few species only are known from the Indic through the Indo-Australian Archipelago to China, Japan, Australia. They attain a large size, living in costal waters and entering rivers.

Key to the indo-australian species of Pelates.

1. D. XII. 10. Second and third anal spines subequal. Maxillary extending to frontborder of eye or nearly so. Four to six dark longitudinal bands on body. 1. *P. quadrilineatus* p. 161.
2. D. XII. 13. Second anal spine longer and much stronger than third. Maxillary far distant from frontborder of eye. Uniform blackish without bands . . 2. *P. römeri* p. 163.

1. **Pelates quadrilineatus** (Bl.).

Holocentrus quadrilineatus Bloch, Ausl. Fische IV. 1797, p. 63.
Pristipoma sexlineatum Quoy & Gaimard, Voyage Uranie et Physicienne. Poiss. 1824, p. 320.
Therapon quadrilineatus Cuvier & Valenciennes, Hist. nat. Poiss. III. 1829, p. 134.
Therapon xanthurus Cuvier & Valenciennes, l. c. p. 135.
Pelates quadrilineatus, *sexlineatus*, *quinquelineatus* Cuvier & Valenciennes, l. c. pp. 146, 147, 148.
Therapon quadrilineatus Bleeker, Percoïden, p. 51. Verh. Bat. Gen. XXII. 1849.
Helotes polytaenia Bleeker, Nat. Tijdschr. Ned. Indië VI. 1854, p. 53. — Atl. ichth. VII. 1873—76. Tab. 315, Fig. 2.
Therapon Cuvieri Bleeker, Nat. Tijdschr. Ned. Indië VI. 1854, p. 211.
Therapon quadrilineatus Günther, Cat. Brit. Mus. I. 1859, p. 282.
Therapon cuvieri Günther, ibid.
Helotes polytaenia Günther, l. c. p. 285.
Therapon quadrilineatus Kner, Novara-Exp. Fische 1865—67, p. 46.
Therapon (Pelates) quadrilineatus Bleeker, Révis. Therapon. Ned. Tijdschr. Dierk. IV. (1872) 1873, p. 389. — Atl. ichth. VII. 1873—76, p. 117, Tab. 292, fig. 2.
Therapon Cuvieri Macleay, Descr. Cat. Austral. Fish. I. 1881, p. 62.
Therapon quadrilineatus Day, Fish. India 4⁰, 1878—1888, p. 70.
Therapon (Pelates) quadrilineatus Klunzinger, Fische Roth. Meer. I. 1884, p. 26.
Terapon quadrilineatus Jordan & Seale, Bull. Bur. fish. XXVI. (1906) 1907, p. 24.
Therapon quadrilineatus Jordan & Richardson, Bull. Bur. fish. XXVII. (1907) 1908, p. 258.
Therapon quadrilineatus Seale, Philippine Journ. Sci. 1910. p. 277.

Pelates quadrilineatus and *sexlineatus* Ogilby & McCulloch, Mem. Queensl. Mus. V. 1916, p. 125. — McCulloch, Biol. Res. „Endeavour" IV. 4, 1916, p. 183 [1]).
Therapon quadrilineatus Jordan & Starks, Ann. Carnegie Mus. XI. N⁰. 3—4, 1917, p. 450.
Therapon quadrilineatus Fowler & Bean, Proc. U. S. Nat. Mus. 62, 1922, p. 32.
Therapon quadrilineatus Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 407.
Pelates sexlineatus Fowler, Fish. Oceania, Mem. Bishop Mus. X, 1928, p. 212.

D. XII. 10; A. III. 9—10; P. 15; V. I. 5; L.l. 68—72.

Height 2.6 to more than 3 in length; head 2.3—3.6, rostrodorsal profile arched, vertex strongly rugose. Eye 3.2 to nearly 4 in head, equal to or one third less than interorbital space. Snout convex, equal to or longer than diameter of eye. Nostrils not approximate, their diameter equal to diameter of posterior nostril. Praeorbital finely denticulate. Upper jaw slightly longer than lower, extending nearly to frontborder of eye or even below it; lips not fleshy. Praeoperculum conspicuously serrate, coarsest at rounded angle. Operculum with two small flat spines, the lower somewhat longer, not surpassing the lobe. Coracoid denticulate, suprascapular bone hidden by scales. Gillrakers lanceolate, about 17+22 on first branchial arch, slightly less than filaments which go twice in eye. Ten to 13 scales between lateral line and middle of spinous dorsal. Teeth in upper jaw in three, in lower in two rows, the outer series much enlarged, with brown tips, flattened, with a conical point, none on vomer and palatines. Spinous portion of dorsal higher than soft-rayed portion, the spines being of moderate size, the fifth to seventh the longest, more or less equal to half height of body, the ultimate and penultimate subequal, much shorter than first dorsal ray; soft dorsal angulate, with the border slightly emarginate or not. Second and third anal spine subequal, somewhat longer than eye; soft part of anal of equal height as soft dorsal, its border slightly emarginate or not. Both fins with a basal scaly sheath. Caudal slightly emarginate, its lobes acute, with 15 divided rays. Pectorals acute, about equal to

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1) Ogilby & McCulloch distinguish two species: *Pelates quadrilineatus* (Bloch) and *Pelates sexlineatus* (Quoy & Gaimard = *Pristipoma sexlineatus* Q. G. Voy. Uranie et Physic. 1824, p. 320) according to the presence of a large black blotch on the dorsal fin between third and eighth spine and a dark shouldermark usually present in the first or the absence of both in the second. Otherwise they are very similar in all structural details, according to the authors. We presume, that both species are not more than colour-varieties, as the colouration of Theraponidae in general is very changeable.

head without snout; ventrals slightly longer, reaching to vent. Colour in alcohol dusky greenish or dull brown or grey above, pale below with a silvery hue; a large dark round mark above the shoulder more or less conspicuous. Usually five dark longitudinal parallel bands, of which one between the first and second band is faint or incomplete; a large black blotch between the third and sixth or eighth dorsal spine usually present. Length 205 mm.

Habitat: Singapore; Bintang (Riouw Archipelago); Banka; Biliton; Nias; Sumatra (Siboga); Java (Batavia, Bantam); Borneo (Sandakan); Celebes (Makassar!, Badjoa, Tanette!, Pare-Pare!, Tello!, Menado); Ternate; Buru; Ambon; Batjan, Ceram; Halmahera; Obi; Timor; Aru-Islands; New Guinea. — Red Sea, Aden, Madagascar, Zanzibar, Delagoa Bay, Madras, Gulf of Manaar, Ceylon, Philippines, Formosa, China, Japan, Australia (Queensland, N. S. Wales, Northeren Australia). In sea and brackish water.

2. **Pelates römeri** M. Web. [Fig. 30, p. 160].

Therapon Römeri M. Weber, Notes Leyden Mus. XXXII. 1910, p. 233.
Therapon Römeri M. Weber, Nova Guinea IX. Livr. 4, 1913, p. 584.
Therapon fuliginosus Fowler, Fish. Oceania, Mem. Bishop Mus. X, 1928, p. 212 (p. p.).

D. XII. 13; A. III. 9; P. 14; V. I. 5; L.l. ca. 62—65.

Height 2.5—2.6 in length; head 3.3, rostro-dorsal profile concave above eye, furtheron convex; naked above, vertex scaly. Eye 5—5.4 in head, somewhat less than twice in the nearly flat interorbital space. Snout bluntly pointed, twice length of diameter of eye. Praeorbital entire. Nostrils: anterior tubular, posterior triangular with membraneous border, distant by the length of the posterior nostril. Upper jaw slightly longer; lips thick; maxillary embraces with a downward directed point the hindborder of intermaxillary and is about half the diameter of the eye distant from the vertical through frontborder of eye. Hindborder of praeoperculum rounded and finely serrated; operculum with two spines, the lower much longer, not surpassing hindborder of operculum. Coracoid truncate, small, with conspicuous coarse denticulation; suprascapulare denticulate. Scales on breast and cheaks much smaller, those on operculum less smaller than those of body. Teeth in jaws dark brown, conical, in upper jaw in about three somewhat irregular rows, more numerous on symphysis, in lower jaw in two rows, those of the outer series conspicuously enlarged; none on vomer and palatines. Spinous portion of dorsal lower than soft portion; rounded, heteracanth, fifth and sixth spines the longest, equal to length of snout, the ultimate and penultimate shorter, of equal size; the first of half length of eye, and more than half length shorter than second. Soft dorsal and anal rounded, their longest ray about equal to length of snout and eye. First anal spine about as long as eye, second somewhat longer and stronger than third, twice length of first. Both fins with a basal scaly sheath. Caudal emarginate with rounded lobes and 15 divided rays. Pectorals rounded, slightly longer than head without snout; ventrals about equal, second prolonged ray not reaching vent. Colour in alcohol uniform blackish, pectorals and ventrals lighter. Length 382 mm. [Type in Museum of Amsterdam seen by us].

Habitat: New Guinea (Lorentz River!).

3. **Helotes** C. V.

(Cuvier & Valenciennes, Hist. nat. Poiss. III. 1829, p. 149).
Helotes Günther, Cat. Brit. Mus. I. 1859, p. 284.
Therapon subgen. *Helotes* Bleeker, Atl. ichth. VII. 1873—76, p. 110. — System. Percar. Arch. néerl. Sc. nat. XI. 1876, p. 267.
Therapon subgen. *Helotes*, Klunzinger, Fische Roth. Meer. 1884, p. 26.

Body oblong or ovate, more or less compressed, covered by small or moderate ciliated scales. Lateral line continuous, only slightly arched conform to the profile of the back, the sensory scales smaller than the scales of the body, with straight simple tubules, extending nearly to hindborder of scales. Head small, snout convex. Mouth small, almost not protractile, its gape square[1]); jaws subequal, the upper slightly longer, situated below horizontal through lower border of eye; lips thin. Nostrils more or less distant. Praeorbital rounded, finely serrated, covering largest part of maxillary. Praeoperculum with rounded angle, which is, even as the hindborder, serrated; operculum with two spines, the upper small and flat, the lower much stronger, surpassing the lobe or not. Coracoid and suprascapulare denticulate or the latter entire. Six branchiostegals; gillmembranes united, their posterior border free from

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1) Cuvier & Valenciennes compare it with that of *Box* and *Amphacanthus*.

isthmus, running as a fold over the isthmus from one gillopening to the other. Teeth brown-coloured, flattened, lanceolate, trilobate or tricuspid, in several rows in jaws, none on vomer and palatines. Spinous portion of dorsal strongly arched, the X—XIV spines heteracanth, rather strong, increasing in size to fifth and decreasing from seventh to the penultimate which is subequal to the ultimate or shorter; the latter has only about half height of soft portion, which has a straight or concave border. Anal with three spines, the second is much stronger than the third or the latter is slightly longer; soft anal equals in structure the dorsal; both fins with a basal scaly sheath. Caudal emarginate with blunt lobes. Pectorals rounded; ventrals originating below their middle, not reaching anus.

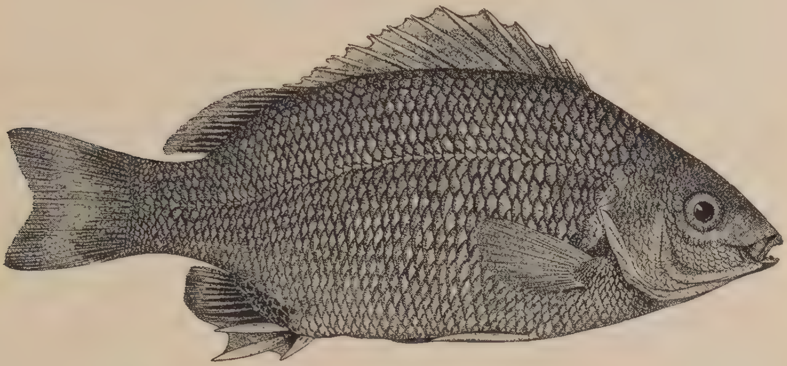

Fig. 31. *Helotes lorentzi* M. Web. After M. Weber.

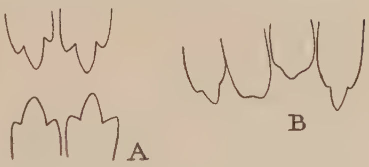

Fig. 32. A. Teeth of *Helotes sexlineatus* (Q. & G.). After Cuvier & Valenciennes. B. Teeth of *Helotes lorentzi* M. Web. — About half nat. size.

Key to the indo-australian species of Helotes.

1. D. XII. 10; A. III. 10—11; about 12 scales between lateral line and scaly sheath at base of middle of spinous dorsal. Nostrils approximate. Four to six dark bands on body . . . . 1. *H. sexlineatus* p. 166.
2. D. XIII—XIV. 11—13; A. III. 8—9; about 7 scales between lateral line and scaly sheath of middle of spinous dorsal. Nostrils distant. Uniform dark coloured, without bands . . . . 2. *H. lorentzi* p. 167.

1. **Helotes sexlineatus** (Q. & G.) [Fig. 32, A, p. 165].

Terapon sexlineatus Quoy & Gaimard, Voy. Uranie & Physicienne 1824, p. 340

Helotes sexlineatus Cuvier & Valenciennes, Hist. nat. Poiss. III. 1829, p. 149.

? *Helotes octolineatus* Jenyns, Zoology Voyage Beagle 1842, p. 18.

Helotes sexlineatus Bleeker, Nat. Tijdschr. Ned. Indië II. 1851, p. 171.

Helotes sexlineatus Günther, Cat. Brit. Mus. I. 1859, p. 285.

Helotes sexlineatus Kner, Novara-Exp. Fische, 1865—67, p. 46.

Therapon (*Helotes*) *sexlineatus* Bleeker, Révis. Therap. Ned. Tijdschr. Dierk IV. 1873, p. 392. — Atl. ichth. VII. 1873—76, p. 118.

? *Helotes octolineatus* Macleay, Descr. Cat. Austral. Fish. I. 1881, p. 68.

? *Helotes profundior* de Vis, Proc. Linn. Soc. N. S. Wales IX. 1884, p. 397.

? *Helotes scotus* Haacke, Zool. Anzeiger VIII. 1885, p. 508.

Helotes sexlineatus Waite, Rec. South Austral. Mus. II. 1921, p. 97.

D. XII. 10; A. III. 10—11; P. 14—15; V. I. 5; L.l. 85—87.

Height about 3.5 to nearly 4 in length; head 4—4.2, its rostro-dorsal profile slightly convex, with an impression near strongly rugose vertex. Eye rather large, in anterior half of head, more or less than thrice in head, about equal to or somewhat longer than interorbital space and convex snout. Praeorbital rounded, finely serrated, covering the largest part of maxillary, when mouth is closed. Nostrils approximate, the anterior tubulate, smaller than the oval or triangular posterior one. Gape of mouth small, jaws equal, lips thin, not reaching to frontborder of eye. Praeoperculum denticulate, stronger at the rounded angle; operculum with two spines, the lower much longer, surpassing the opercular lobe. Coracoid truncate and roughly denticulate; suprascapulare entire. About 12 scales between lateral line and middle of spinous dorsal. Teeth in jaws brown-coloured, in several irregular series, the outer enlarged, trilobate or tricuspid; none on vomer and palatines. Spinous dorsal strongly arched, emarginate, the ultimate spine somewhat longer than the penultimate, about half as long as first ray, the fifth and sixth spine the highest, much higher than half height of body and height of soft dorsal, the border of which is concave. Third anal spine subequal to or somewhat longer than second; soft anal in height and structure equal to soft dorsal. Both fins with a scaly basal sheath. Caudal feebly emarginate, the lobes pointed, somewhat longer than head without snout; with 15 divided rays. Pectorals acutely pointed, somewhat shorter than ventrals, originating below middle of pectorals. Colours greyish or bluish on back, silvery below, 4 to 6 dark longitudinal bands, the first from interorbital space along base of spinous dorsal, the second below it to base of soft anal, the third from above eye to upper border of caudal peduncle, containing an oval blotch on shoulder; the fourth from snout, through eye to caudal, the fifth from corner of mouth to pectoral or continued to caudal; the fifth, often obsolete from pectoral to soft anal. Upper half of spinous dorsal and front top of soft dorsal more or less blackish as also their basal membrane; caudal with a dark border and a faint intermediate and basal transverse band. Length about 200 mm.

Habitat: Singapore; Bintang (Riouw Archipelago); Biliton; Nias; Java?; Ceram (Wahai); Aru Islands. — Philippines, Tonkin, Formosa, Thursday Island!, Australia. — In sea.

2. **Helotes lorentzi** M. Web. [Fig. 31 and Fig. 32, B, p. 165].

Helotes Lorentzii Max Weber, Notes Leyden Mus. XXXII. (1910) 1911, p. 236.
Helotes Lorentzi Max Weber, Nova Guinea IX. livr. 4, 1914, p. 586.
Helotes Lorentzi Fowler, Fish. Oceania, Mem. Bishop Mus. X. 1928, p. 212.

D. XIII. 11—13 or XIV. 13; A. III. 8—9; P. 15; V. I. 5; L.l. 52—54.

Height 2.3 in length; head 3.4—3.6, rostro-dorsal profile slightly concave on occiput and somewhat convex above orbits. Eye situated about in the middle of the head; 4—4$^1/_2$ in head, its diameter more than $^1/_3$ shorter than the more or less arched interorbital space and about $^1/_3$ shorter than the pointed snout. Praeorbital rounded, slightly serrated. Nostrils: anterior tubulate, posterior oval with elevated rim, far distant, their distance at least twice the distance of longest diameter of posterior nostrils. Gape of mouth small, square, situated below horizontal through lower border of eye; mouth almost not protractile, lips thin. Upper jaw slightly the longest; maxillary nearly totally hidden below praeorbital when mouth is closed, reaching only to middle of snout. Praeoperculum with rounded angle, above it sharply denticulate; a broad rim free from scales, 5 series of scales between it and lower border of eye, 2 series behind it. Operculum with two spines, the lower much stronger but not surpassing opercular lobe. Coracoid truncate, denticulate, suprascapulare small, rounded, coarsely denticulate. Between lateral line and middle of spinous dorsal about 7 scales. Gillrakers about 12 on anterior arch, very short and conical. Teeth in jaws at least in three series, brown coloured, flattened, the most anterior the largest, lanceolate or trilobate or tricuspidate; none on vomer, palatines and tongue. Spinous dorsal rounded, much longer and higher than the soft dorsal, the upper margin of which is nearly straight, its corners somewhat rounded. The dorsal spines rather strong, heteracanth, the sixth and seventh or fifth and sixth the longest, almost twice as long as the penultimate which is slightly longer than the ultimate. Second anal spine the longest about twice longer than the first. Soft dorsal and anal nearly as high as length of head without snout. Both fins with a scaly sheath at their base. Rounded pectorals and ventrals about as long as head without snout. Caudal emarginate. Colour in alcohol uniform dark dusky, especially at back, scales of sides and belly with a central silvery hue; median fins blackish with a lighter margin. Length 185 mm. [Type in Museum of Amsterdam seen by us].

Habitat: South New Guinea (Lorentz River near Regen-Island!, Noord River!, Upper Digul River!).

9. Family SILLAGINIDAE.

Body elongate, slightly compressed, usually tapering from middle of spinous dorsal to head and tail; covered by small or moderate-seized ctenoid scales; lateral line complete, continued on caudal, slightly arched, the sensory scales with a simple tube. Head conical, pointed, forehead flattened; bones of head partly with muciferous cavities; on vertex and nape with scales, those on cheeks, praeoperculum and operculum usually cycloid, otherwise naked. Mouth small, terminal, low down, lower jaw included; intermaxillary protractile, maxillary concealed beneath the large, elongate praeorbital. Nostrils small, approximate, quite near to eye, which is usually large, oval, situated laterally, about in the middle of head. Praeoperculum has the upper vertical limb slightly denticulate or crenulate, the lower horizontal, bent inward, nearly meeting that of the opposite side and covering lower surface of head; operculum small with a small, sharp spine. Six branchiostegals; gillmembranes united, free from isthmus; four gills, a slit behind the fourth; gillrakers lanceolate or slender, rather short, 7—9 + 2—3 rudimentary ones or 10—17 on lower limb of anterior arch; pseudobranchiae and a subocular shelf present. Teeth in jaws in broad villiform bands, in one genus an outer series of caninoids; small teeth in front of vomer, none on palatines. Two dorsal fins, the first originating about above middle of pectorals, short with IX—XII long slender spines, the second of which is in one case prolonged into a long filament; the soft dorsal approximate, long, with a weak spine and 16—26 divided rays; anal with II weak spines and 15—27 divided rays, both fins without a basal scaly sheath, the dorsal and anal may have an interradial squamulation. Caudal truncate or emarginate, with 15 divided rays. Pectorals asymmetrical; ventrals situated below base of pectorals, pointed, with 5 divided rays and a straight slender spine, which exceptionally is thickened and curved or consolidated with the thickened first ray, forming with it a single body. No scale-like process in the ventral axil. (This is wrongly represented in most of the figures of *Sillago* by Bleeker).

Distribution: Marine fishes of small or moderate size, frequenting the coasts of the western part of the Indo-Pacific, from the East coast of Africa to Australia, China and Japan; ascending estuaries and tidal rivers. In many places of commercial value.

Note: Cuvier & Valenciennes (Hist. Nat. Poiss. III 1829) already recognised that *Sillago* „doit entrer dans la famille des Percoïdes" (p. VII) „Tous ces caractères, dont l'ensemble détermine bien un genre particulier dans la famille des percoïdes" (p. 399) and that it does not belong to the Sciaenidae in their neighbourhood it usually is placed.

1. Sillago Cuvier ¹).

(Cuvier, Règne animal II. 1817, p. 258).
Sillago (Cuv.) Bleeker, s. st. Mém. s. l. Sciénoïdes & Sillaginoïdes, Verh. Akad. Amsterdam XIV. (1873) 1874, p. 63.

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1) The not numerous species of *Sillago* sensu lato, are divided by Gill (1861) and Bleeker in the genera *Sillago* Cuv., *Sillaginodes* Gill and *Sillaginopsis* Gill. *Sillaginodes* seems to us scarcely worthy of generic distinction; but *Sillaginopsis* differs more essentially from *Sillago* by the enlarged outer series of teeth in the jaws, by the prolongation of the second dorsal spine into a long filament, by the reduced number of dorsal spines (IX), by the small eye, the depressed head and other characters. The indo-australian species, in any case, belong to *Sillago* s. str.

Snout conical. Teeth in jaws and vomer evenly small. First dorsal with XI slender spines, none of them with a setaceous prolongation; second dorsal 19—23; anal II, 18—24. Ventral spine straight and slender or thickened and curved. Lateral line 50 to nearly 80. For other characters see those of the family.

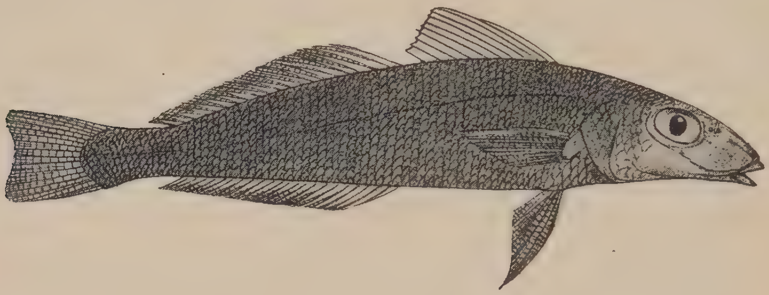

Fig. 33. *Sillago sihama* (Forsk.) $^5/_9$ nat. size.

Distribution: Western part of the Indo-Pacific region from Red Sea, East Coast of Africa, Madagascar through Indic to coast of India, China, Japan, Philippines, indo-australian Archipelago, Australia, to Bougainville Islands. In sea, estuaries and tidal rivers.

Key to the indo-australian species of Sillago.

I. Lateral line about 55; between lateral line and anterior dorsal rays $3^1/_2$—4 scales. Snout slightly longer than eye, which is twice longer than interorbital space. Preopercular and opercular scales cycloid; two series of scales on cheeks. Ventral spine slender, normal . . . 1. *S. macrolepis* p. 171.

II. Lateral line 68 to more than 70. Snout much longer than eye. Three series of scales on cheeks.

  1. Ventral spine slender, normal. Diameter of eye much shorter than snout, equal to or slightly longer than interorbital space.

    a. Anal II. 22—24. Dorsal XI, I. 20—23. Body without dark blotches.

      α. 5—6 series of scales between lateral line and anterior dorsal spines; preopercular and opercular scales cycloid. . . . . 2. *S. sihama* p. 172.

      β. 3 series of scales between lateral line and anterior dorsal spines; preopercular and opercular scales ctenoid. . . . . 3. *S. japonica* p. 173.

b. Anal II. 18—21; D. XI. I, 19—21. 5—6 series of scales between lateral line and anterior dorsal spines; preopercular and opercular scales ctenoid. Body with large dark blotches . . . . 4. *S. maculata* p. 174.

2. Ventral spine thickened, consolidated with the first thickened ray. Anal II. 23—24. Dorsal XI. I. 21—22. All scales on head ctenoid. Body without dark blotches. 5. *S. chondropus* p. 176.

Doubtful species 6. *S. ciliata* p. 178.

1. Sillago macrolepis Blkr.

Sillago macrolepis Bleeker, Nat. Tijdschr. Ned. Indië XVII. 1858—59, p. 166. — Mém. Sciénoïdes, Sillaginoïdes, Verh. Akad. Amsterdam, XIV. (1873) 1874, p. 72. — Atl. ichth. IX. 1877, Tab. CCCLXXXIX, fig. 1.
Sillago macrolepis Meyer, Anal. Soc. Esp. Hist. Nat. XIV. 1885, p. 28.
Sillago macrolepis Evermann & Seale, Bull. Bur. Fisheries XXVI. 1906, p. 87.
Sillago macrolepis de Beaufort, Bijdr. Dierk. Leiden 1913, p. 120.

D. XI. I. 19—21; A. II. 19—21; P. 14—15; V. I. 5; L.l. 55—56; L. tr. $\begin{array}{c}3^1/_2\text{—}4\\\hline 1\\\hline 7\end{array}$.

Height 5—5.5 in length; head 3.5—4, acute, its rostro-frontal profile slightly convex, scales on vertex, interorbital space and opercular apparatus cycloid. Eye 3.2—4 in head; interorbital space about half its length, slightly shorter than convex snout, which goes 2.35—2.7 in length of head. Mouth small, lower jaw included, upper jaw far distant from anterior nostril. Vertical limb of praeoperculum with an indication only of crenulation; operculum with a small spine. Two series of scales on cheeks. About 17 slender gillrakers on lower limb of anterior arch, half length of eye. Villiform teeth in jaws and on vomer, the outer intermaxillary series slightly enlarged. Between lateral line and anterior dorsal rays $3^1/_2$—4 series of scales. Dorsals very approximate, the spinous with slender spines, decreasing in length posteriorly, the anterior somewhat higher than soft-rayed dorsal but slightly lower than height of body; soft dorsal slightly emarginate, basally with small interradial scales; anal of similar size, without squamulation. Caudal little emarginate, nearly truncate, with 15 divided rays and nearly equalling head without snout. Pectorals and ventrals of about similar length, the latter with the outer rays with filamentous, prolonged tips, the spine slender. Colour in alcohol yellowish, darker above, a diffuse silvery band from head to tail, dorsals dusky with a narrow blackish margin. Length 200 mm.

Nom. indig.: Pajus, Peren, Speren (Malay. Batavia).

Habitat: Java (Batavia); Bali; Ambon!; Celebes (Menado); Waigeu (Saonek!). — Philippines.

2. **Sillago sihama** (Forsk.) [Fig. 33, p. 170].

Atherina sihama Forskål, Descr. anim. 1775, p. 70.
Platycephalus sihamus Bloch, Schneider, Syst. Ichth. 1801, p. 60.
Sciaena malabarica Bloch, Schneider, ibid. p. 81.
Sillago acuta Cuvier & Valenciennes, Hist. nat. Poiss. III. 1829, p. 400.
Sillago erythraea Cuvier & Valenciennes, ibid. p. 409.
Sillago sihama Rüppell, Reise N. Afrika, Atlas, 1826—1831, p. 9.
Sillago acuta Bleeker, Percoidea, Verh. Batav. Gen. XXII. 1849, p. 61.
Sillago malabarica Cantor, Cat. Malay. Fish. 1850, p. 1003.
Sillago malabarica Bleeker, Nat. Tijdschr. Ned. Indië XVII. 1858—59, p. 157.
Sillago sihama Günther, Cat. Brit. Mus. II. 1860, p. 243.
Sillago acuta Kner, Reise Novara, 1865—1867, p. 128.
Sillago sihama Klunzinger, Abh. zool. bot. Ges. Wien XX. 1870, p. 818. — Sitzber. Akad. Wien, 1880, p. 369. — Fische Roth. Meer. 1884, p. 123.
Sillago sihama Bleeker, Sciénoïdes, Sillaginoïdes, Verh. Akad. Amsterdam XIV. (1873) 1874, p. 67. — Atl. ichth. IX. 1877, pl. CCCLXXXIX, fig. 4.
Sillago gracilis Alleyne & Macleay, Proc. Linn. Soc. N. S. Wales, I. 1876, p. 279 (fide Fowler).
Sillago sihama Day, Fish. India 4°, 1878—1888, p. 265.
Sillago sihama Steindachner & Döderlein, Fische Japans, Denkschr. Akad. Wien XLIX. 1884, p. 192.
Sillago sihama Jordan & Snyder, Proc. U. S. Nat. Mus. XXIV. 1902, p. 486.
Sillago sihama Gilchrist & Thompson, Ann. South Afric. Mus. VI. 2, 1908, p. 192.
Sillago sihama Fowler & Bean, Proc. U. S. Nat. Mus. LXII, 1922, p. 68.
Sillago sihama Chaudhuri, Mem. Indian Mus. V. 1923, p. 721.
Sillago sihama Barnard, Ann. S. African Mus. XXI. 1925—27, p. 507.
Sillago sihama Fowler, Fish. Oceania, Mem. Bishop Mus. X. 1928, p. 235.

D. (X) XI. I. 20—23; A. II. 22—24; P. 15—17; V. I. 5; L.l. 69—73; L. tr. $\frac{5-6}{10-12}$.

Height 5.2—5.5 in length; head 3.5, elongate, pointed, its rostro-dorsal profile slightly convex; occiput with ctenoid, interorbital space and cheeks with cycloid scales. Snout convex, much longer than eye, which goes 3.5 to nearly 4 times in head and is equal to or somewhat longer than interorbital space. Mouth small, terminal, far distant from eye; the lower jaw included. Opercular apparatus with cycloid scales, three series of scales on cheeks; vertical limb with superficial but distinct denticulations, operculum with a small but conspicuous spine. Gillrakers 7—9, with some rudimentary ones on lower limb of first arch. Teeth villiform, slightly unequal, in bands on jaws, in a semicircular band on vomer. Four to five scales between lateral line and first spine of dorsal. The two dorsals are approximate, the first higher than the second, with XI weak flexible spines, the second and third subequal, slightly shorter than height of body. Second dorsal with a weak flexible spine, the rays decreasing in length, the first more than half height of body below it. Anal similar to soft dorsal but lower; the second of its two rather weak spines stronger; membrane of both soft fins with one series of scales between the rays. Caudal truncate or slightly emarginate, about equal to head without snout, with 15 divided rays. Pectorals acute, $^1/_2$ or $^3/_4$ length of head; verticals below their base, of similar length, their spine slender and straight. Colour in alcohol olivaceous or grey above, lighter below with a silvery hue, a diffuse silvery band along body, lightly fading. Length to about 300 mm.

Nomen indig.: Pajus, Peren, Speren (Mal. Batavia); Ubi (Malay. Pinang); Burdjun (Sudan.); Bodjor, Waridjung (Javan.); Katjangan (Madura).

Habitat: Singapore; Pinang; Sumatra (Padang, Priaman, Siboga, River Serang, Trussan, Telok Betong, Benkulen, Palembang); Nias; Bintang; Riouw Arch.; Banka; Biliton; Java (Batavia, Prigi, Japara); Madura; Bali; Sumbawa; Borneo (Sandakan, Singkawang); Celebes (Makassar!, Tanette!, Bulucomba, Bonthain, Badjoa, Lagusi, Menado); Saleyer!; Sangir Isl.; Batjan; Obi major!; Buru; Ambon!; Ceram; Timor; New Guinea (Doreh). — Red Sea, Aden, Zanzibar, Beira!, Chinde, Coast of Natal (Durban!, Delagoa Bay), Madagascar, Bourbon, Mauritius, Seychelles, Andamans, Nicobars, Muscat, India (Chilka Lake, Madras, Orissa, Gulf of Manaar), Ceylon!, Malayan Peninsula, Siam, Bangkok, China (Canton, Amoy, Hongkong), Formosa, Japan north to Tokyo, Philippines, Australia (Queensland), Thursday Isl., New Pommern, Bougainville Isl., Admirality Isl. — In sea, estuaries and brackish water of rivers.

3. **Sillago japonica** Schlegel.

Sillago japonica Schlegel in Temminck & Schlegel, Fauna Japon. Poiss. 1846, p. 33.
Sillago japonica Richardson, Fish. China Japan, Rep. 15th Meet. Brit. Assoc. 1846, p. 223.

Sillago japonica Bleeker, Bijdr. Japan p. 11 Acta Soc. Sc. Indo-Neerl. III. 1858. — Nat. Tijdschr. Ned. Ind. XVII. 1858—59, p. 163. — Mém. Sciénoides, Sillaginoides, Verh. Akad. Amsterdam XIV. (1873) 1874, p. 69. — Atl. ichth. IX. 1877, pl. CCCLXXXIX. fig. 6.

Sillago sihama Steindachner & Döderlein, Fische Japans, Denkschr. Akad. Wien XLIX. 1884, p. 192.

Sillago japonica Jordan & Snyder, Proc. U. S. Nat. Mus. XXIV. (1901) 1902, p. 487.

Sillago japonica Fowler & Bean. Proc. U. S. Nat. Mus. LXII, 1922, p. 69.

D. XI, I. 22—23; A. II. 22—23; P. 15; V. I. 5; L.l. 68—70; L. tr. $\frac{3}{10}$.

Height 5.5—5.75 in length; head 3.5—3.75, acute, its profile slightly convex, scales on vertex, interorbital space and opercular apparatus ctenoid. Eye 4—4.5 in head, equal to interorbital space and much shorter than pointed snout, which goes 2.5—2.75 in length of head. Lower jaw included, upper far distant from anterior nostril. Vertical limb of praeoperculum finely serrate; operculum with a small spine. Three series of scales on cheeks. Ten gillrakers on lower limb of anterior arch. Villiform teeth in jaws and on vomer. Dorsals approximate, the anterior higher than soft dorsal, its spines slender, decreasing in size posteriorly, their height less than that of body; soft dorsal with the margin nearly straight; the membrane with a single series of small scales between the rays. Anal of similar structure and length. Caudal slightly emarginate, about equal to head without snout. Pectorals pointed, nearly of length of caudal; ventrals somewhat shorter, with a slender spine. Colour in alcohol olivaceous or dull brownish, darker on back, lighter below with a silvery hue; a diffuse silvery band from head to tail. Length over 230 mm. [Not seen by us].

Habitat: Java (Batavia); Ambon. — Formosa, common on the coasts of Japan where it is an important food-fish. In sea.

4. **Sillago maculata** Q. G.

Sillago maculata Quoy & Gaimard, Voy. Uranie & Physic. 1824, p. 261.

Sillago maculata Cuvier & Valenciennes, Hist. nat. Poiss. II. 1829, p. 411.

Sillago burrus Richardson, Icon. Piscium 1843, p. 5.

Sillago maculata Bleeker, Percoid. p. 62, Verh. Bat. Gen. XXII. 1849, — Nat. Tijdschr. Ned. Indië XIII. 1858—59, p. 161. — Mém. s. l. Sciénoïdes et l. Sillaginoïdes, Verh. Akad. Amsterdam XIV. (1873) 1874, p. 71. — Atl. ichth. IX. 1877, pl. CCCLXXXIX. fig. 5.

Sillago maculata Günther, Cat. Brit. Mus. II. 1860, p. 245.

Sillago maculata Kner, Novara-Exp. Fische, 1865—67, p. 127.
Sillago gracilis Alleyne & Macleay, Proc. Linn. Soc. N. S. Wales I. 1877, p. 279.
Sillago maculata Day, Fish. India 4⁰, 1878—88, p. 265.
Sillago maculata Macleay, Descr. Cat. Austral. Fish. I. 1881, p. 201.
Sillago maculata McCulloch, Check-list fish. N. S. Wales, Austral. Zoologist I. 1919, p. 51.
Sillago maculata Fowler, Proc. Acad. Nat. Sc. Philadelphia LXXVII. 1925, p. 248.
Sillago maculata Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 508.

D. (X) XI. I. 19—21; A. (I) II. 18—21; P. 16—17; V. I. 5; L.l. 70—74; L. tr. $\frac{5-6}{10-12}$.

Height more or less than 5 in length; head about 3.25, pointed, its rostro-frontal line slightly convex; the vertex and opercular apparatus covered with ctenoid, the interorbital space with cycloid scales. Eye more or less than $3^1/_2$ in head, its diameter more than interorbital space, much shorter than snout. Mouth small, lower jaw included, the upper reaches nearly half way to below frontborder of eye. Ten gillrakers on lower limb of anterior arch. Vertical limb of praeoperculum finely serrated, operculum with a small spine. Three series of scales on cheeks. Five to six spines between lateral line and anterior dorsal spine. A band of villiform teeth in jaws and on vomer. Dorsal fins approximate, the anterior conspicuously higher than the posterior, its spines slender, weak, the third to fifth subequal, about as high as body, their membrane squamulate; soft dorsal slightly emarginate, without interradial scales. Anal of similar structure and length. Caudal slightly emarginate, about equal to head without snout. Pectorals and ventrals acute, subequal, about as long as head without snout. Colour in alcohol yellowish or greyish above, lighter below, belly silvery; a median silvery longitudinal band, back and sides with irregular blackish blotches; spinous dorsal with a black border, basally with dark spots; soft dorsal with two dark longitudinal stripes and a dark border, also anal with a dark margin. Length up to 300 mm.

Nomen indig.: Pajus, Peren (Malay.).

Habitat: Singapore; Bintang (Riouw Arch.); Banka; Lepar Isl.; Java (Batavia); Celebes (Makassar!, Tanette!). — Coast of Natal, Andamans, Philippines, Tonkin, China, Australia (Queensland, New South Wales, Victoria, West Australia), Tasmania. — In sea.

5. **Sillago chondropus** Blkr. [Fig. 34, p. 176].

Sillago chondropus Bleeker, Percoidea, Verh. Batav. Gen. XXII. 1849, p. 61. — Nat. Tijdschr. Ned. Ind. XVII. 1858—59, p. 164 — Mém. Sciénoides, Sillaginoïdes, Verh. Akad. Amsterdam XIV. (1873) 1874, p. 65. — Atl. ichth. IX. 1877, Tab. CCCLXXXIX. fig. 2.

? *Sillago chondropus*, Gilchrist & Thompson, Ann. South African Mus. VI. pt. 2, 1908, p. 193. — Ann. Durban Mus. I. pt. 4, 1917, p. 348.

? *Sillago chondropus* Barnard, Ann. South. African Mus. XXI. 1925—27, p. 508.

B. 6. D. 11—1/21 vel 11—1/22. P. 2/13 ad 2/15. V. 1/5. A. 2/23 vel 2/24. C. 1/15/1 et lat. brev.

Sillag. corpore elongato compresso, altitudine $7^{1}/_{3}$ ad $7^{1}/_{2}$ in ejus longitudine, latitudine $1^{1}/_{5}$ ad $1^{1}/_{4}$ in ejus altitudine; capite acuto parum vel non convexo $4^{2}/_{3}$ ad 5 in longitudine corporis; altitudine et latitudine capitis 2 circ. in ejus longitudine; oculis diametro $3^{2}/_{3}$ ad 4 in longitudine capitis, diametro $^{1}/_{2}$ ad $^{2}/_{3}$ distantibus; linea rostro-frontali rectiuscula vel convexiuscula; rostro vix vel non convexo, junioribus et aetate provectis oculo multo longiore; maxilla superiore maxilla inferiore longiore et latiore longe ante oculum desinente; dentibus maxillis vomerinisque parvis, maxillis serie externa ceteris paulo majoribus; dentibus pharyngealibus ex parte conicis acutis, ex parte molaribus graniformibus vel planis; praeoperculo superne tantum leviter vix conspicue denticulato vel crenulato, squamis ctenoïdeis ante limbum triseriatis limbo uniseriatis; operculo spina parva bene conspicua; squamis operculo, capite superne totoque corpore ctenoïdeis, ex parte squamulatis; squamis angulum aperturae branchialis superiorem inter et basin pinnae caudalis supra lineam lateralem in series 75 circ., infra lineam lateralem in series 70 circ. transversas dispositis; squamis 13 in serie transversali basin pinnae ventralis inter et dorsalem quarum 5 lineam

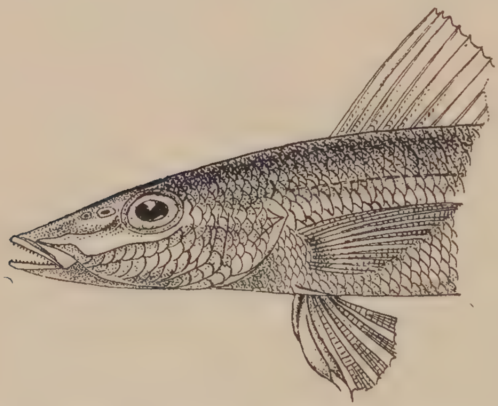

Fig. 34. *Sillago chondropus* Bleeker, to show the modified ventral fin. After Bleeker.

lateralem inter et spinas dorsales anteriores; squamis lateribus squamis dorso caudaque vix majoribus; linea laterali singulis squamis tubulo simplice vel subsimplice notata; pinna dorsali spinosa dorsali radiosae non vel fere contigua, dorsali radiosa altiore et corpore paulo vel non altiore, longitudine 2 fere in longitudine dorsalis radiosae, acuta, spinis gracilibus flexilibus non productis anterioribus squamatis ceteris longioribus; dorsali radiosa leviter emarginata antice acutiuscula inter singulos radios squamata squamis uniseriatis margini radii anteriori approximatis; pectoralibus acutis capite absque rostro paulo longioribus; ventralibus obtusis rotundatis capite absque rostro brevioribus, spina gracillima cum radio 1° coalita, radio 1° valde incrassato cartilagineo apice bifido; anali leviter emarginata, antice obtusiuscula, dorsali radiosa humiliore sed paulo longiore, squamis interradialibus conspicuis nullis; caudali extensa leviter emarginata angulo superiore acuta angulo inferiore rotundata capite absque rostro longiore; colore corpore superne flavescente-olivaceo, inferne argenteo hyalino; iride flava superne fusca; vitta cephalo-caudali argentea diffusa quasi subcutanea; pinnis ventralibus et anali flavescentibus albo marginatis, ceteris hyalinis. Longitudo 3 speciminum 134''' ad 224'''. [After BLEEKER].

Nomen indig.: Pajus, Peren, Speren (Malay. Batav.).

Habitat: Java (Batavia); Nias!; in mari.

Note. We are not sure, that the african specimens, described by GILCHRIST & THOMPSON as *S. chondropus* Blkr., belong to that species, as some of the measurements differ considerably; besides the authors and also BARNARD (l. s. c.) call the ventral spine shortened and thickened into a falciform club. After the above was printed we received a specimen from Nias, which agrees with BLEEKER's description. As BLEEKER we find also that spine normal (not „thickened" as in our key on p. 171) but very slender and consolidated with the much thickened first ray both forming a single body, though his figure, reproduced above, is not quite conform to his description.

BLEEKER made his description after three specimens of 134 to 224 mm. length, caught in sea at Java (Batavia); our specimen from Nias is 135 mm. long.

Doubtful species.

6. **Sillago ciliata** C. V.

Sillago ciliata Cuvier & Valenciennes, Hist. Nat. Poiss. III. 1829, p. 415.
Sillago diadoi Thiollière, Fauna Woodlark, 1857, p. 151 (fide Flower).
Sillago ciliata Günther, Cat. Brit. Mus. II, 1860, p. 245.
Sillago insularis Castelnau, Proc. Zool. Acclimat. Soc. Victoria II, 1873, p. 113.
Sillago ciliata Fowler, Fish. Oceania, Mem. Bishop Mus. X, 1928, p. 235.

Bleeker quotes this australian and melanesian species from „Batavia" in one of his first publications about fishes (Bijdragen tot de Geneeskundige Topographie van Batavia, Generisch Overzicht der Fauna in: Natuur- & Geneesk. Arch. v. Nederl. Indië II. 1845, p. 527). This was certainly an erroneous determination. Bleeker himself never again mentioned this species. No one else has ever found it in the Archipelago.

10. Family EMMELICHTHYIDAE auct.

(Erythrichthyidae; Dipterygonotidae (Bleeker 1876) Chabanaud emend. (1924)).

Body elongate, more or less slender, not much compressed, covered with small or moderate ciliated scales, lateral line slightly arched, its sensory scales with a simple tube. Head totally scaly or nearly so, tip of snout usually naked; obtusely conical; gape of mouth oblique, chin prominent, intermaxillary and maxillary very protractile, the last broadened posteriorly, naked or scaly, with or without a supplemental bone. Nostrils close together or distant, they may be tubular. Praeorbital elongate, emarginate and narrow, at least above angle of mouth, which reaches to about anterior third of eye. Hindborder of praeoperculum straight or concave, entire; the more or less rounded angle finely serrate or crenulate; operculum with one or two spines or ending in a flat spine. Six to seven branchiostegals; gillrakers, as far as known, 25—26 on lower limb of first arch, long and slender; pseudobranchiae present. Minute or even microscopical teeth in a single row or in a small villous band in jaws, or they are toothless; palate and tongue toothless or vomer with a small patch of minute teeth. Dorsal originating above base or middle of pectorals, its spines slender, decreasing in size posteriorly, the posterior spines being connected by membrane and not separated from the soft dorsal (appearing thus only when interradial membrane is broken); the dorsal being more or less deeply notched at the end of its spinous portion; or the last or the four or five last spines are much shortened and isolated and provided with a short triangular basal membrane. Soft dorsal and anal subequal, with a rather broad basal scaly sheath; three strong or weak anal spines. Pectorals more or less falcate; ventrals originating below their base or nearer their middle, with a spine and 5 rays and a scale-like process in its axil. Caudal deeply forked [1]).

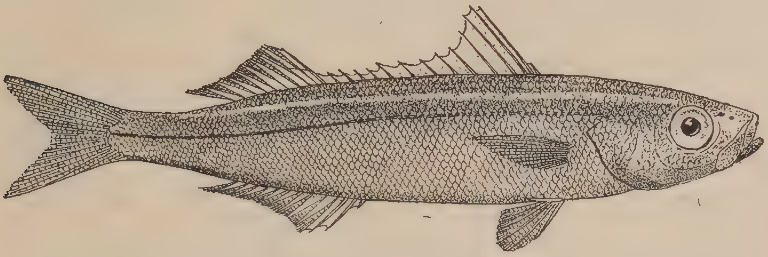

Fig. 35. *Dipterygonotus leucogrammicus* Blkr. nat. size.

Distribution: Small or moderate-seized fishes, living in deep or superficial costal water of the western part of the indo-pacific region: from the coast of Africa to Australia, New Zealand, Ceylon, the indo-australian Archipelago, the Philippines and the coast of Annam; some living in shoals, entering even brackish water. The neglected genera *Boxaodon* and *Inermia* (see footnote below) occur the first at Chili, the second at Haiti.

1. **Dipterygonotus** Blkr.

(Bleeker, Journal Indian Archipelago III. 1849, p. 71).

Chabanaud, Bull. Soc. Zool. de France XLIX. 1924, p. 255.

Body slender, elongate, not much compressed, with evenly, symmetrical outlines; scales small, cilliated; lateral line nearly

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1) This diagnosis is made with exclusion of the somewhat dubious genera *Inermia* Poey (Cuba) and *Boxaodon* Gay (Chili); all the other genera *Emmelichthys* Richardson, *Erythrocles* Jordan (= *Erythrichthys* Temminck & Schlegel), *Dipterygonotus* Bleeker, *Plagiogeneion* Forbes belong to the western part of the indo-pacific region. *Boxaodon* is said to have the mouth only little protractile and only 2 anal spines; while *Inermia* seems to have a narrow maxillary.

straight, the sensory scales with a simple tube. Head scaly, only the frontpart of the snout naked; conical, the maxillaries naked, strongly broadened and rounded posteriorly, partly slipping below praeorbital; the intermaxillaries very protractile, the mouth, when protracted, forming a horizontal tube; the maxillaries also strongly protractile; a supplemental maxillary bone wanting. Eye with or without an adipose eyelid; nostrils distant, oblong, tubular or not. Hindborder of praeoperculum vertical, entire, the rounded angle slightly denticulate; operculum at its angle with a flat spine. Six branchiostegals; gill-membranes separate, free from isthmus. Teeth in jaws minute, those on vomer in an oval group or the teeth wanting. Spinous part of dorsal originating above middle of pectorals, the 10 anterior slender spines united by membrane, the second, third and fourth the longest, the four or five posterior spines short, isolated, with a short triangular membrane; soft-rayed dorsal shorter and less high. Anal with 3 spines, the rays of similar structure and length as in the soft dorsal. Pectorals asymmetrical; ventrals below about middle of pectorals, with a slender spine and 5 rays. Caudal deeply incised. Vertebrae 10 + 14, the third to ninth with transverse apophyses and seven pairs of ribs.

Distribution: Small fishes, living in costal sandy, undeep waters, entering estuaries, from the indo-australian Archipelago, extending to Ceylon, the Philippines and the coast of Annam.

1. **Dipterygonotus leucogrammicus** Blkr. [Fig. 35 p. 179].

Dipterygonotus leucogrammicus Bleeker, Journ. Ind. Archipelago III. (1848) 1849, p. 71.

Emmelichthys leucogrammicus Bleeker, Nat. Tijdschr. Ned. Indië I. 1850, p. 103. — Maenoiden p. 10. Verh. Batav. Gen. XXIII. 1850.

Erythrichthys leucogrammicus Günther, Cat. Brit. Mus. I. 1859, p. 396.

Dipterygonotus leucogrammicus Bleeker, Arch. néerl. Sc. nat. VIII. (1872) 1873, p. 158. — Atl. ichth. VIII. 1876—77, p. 42.

Erythrichthys leucogrammicus Johnstone, Pearl Oyster Rep. II. Fishes 1904, p. 221 [1]).

Emmelichthys leucogrammicus Evermann & Seale, Bull. Bureau Fisher., XXVI, 1906, p. 71.

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1) The figure does not harmonize with the description and is very defective, it shows f. i. the ventrals implanted before the pectorals; the pectorals, the mouth parts and other details quite wrong.

Emmelichthys leucogrammicus M. Weber, Siboga-Exp. Fische, 1913, p. 275.
Emmelichthys leucogrammicus de Beaufort, Bijdr. Dierk. Leiden 1913, p. 121.
Dipterygonotus leucogrammicus Chabanaud, Bull. Soc. Zool. de France XLIX, 1924, p. 255.

D. XIV. I 9; A. III. 10; P. 15—17; V. I. 5; L.l. ca. 80; L. tr. $\frac{10}{16}$.

Height 4.5—5 in length; head about 4, conical; eyes 3 or somewhat more in head, with a very narrow adipose eyelid, its diameter nearly equal to interorbital space; snout shorter, when protruded nearly equal to half length of head. Nostrils distant, the anterior conspicuously tubular, the posterior quite near vertical through frontborder of eye. Maxillary rounded posteriorly, naked, reaching below frontborder of eye. Praeorbital elongate, its border convex, above corner of mouth strongly narrowed. Praeoperculum with the hindborder nearly vertical, entire, the rounded angle finely denticulate, operculum with a flat spine. Dorsal as described in genus, the second, third and fourth spine the longest, about $1^1/_2$ times in height of body, the 4 posterior isolated spines very short; soft-rayed portion of dorsal, lower and much shorter than spinous portion. First spine of anal short, the second and third longer and subequal. Pectorals pointed, about equal to head without snout. Ventrals below middle of pectorals, slightly longer than postocular part of head. Caudal deeply incised, equalling about postocular length of head. Colour in alcohol greyish above, silvery below, back with 3 whitish longitudinal bands, Length 100 mm.

Habitat: Lombok!; Lamakera!; Celebes (Makassar, Bulucomba, Palima!); Saleyer!; Buton!; Buru; Ambon!; Binongka! — Philippines, Ceylon, Annam. — In sea and brackish water; on the surface and in depths up to 15 M., prefering enclosed, sandy bays.

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11. Family BATHYCLUPEIDAE.

Head and body compressed; head naked, with large mucous cavities and a flat interorbital space; its nape and the body covered with large deciduous cycloid scales, those of the straight lateral line more fixed. Mouth oblique to subvertical, wide, mandibulary prominent, somewhat enclosed by the long intermaxillaries, which are continued by the broad maxillaries which have a supplemental bone. Nostrils small, almost superior, contiguous, also to the large eye, the main part of which is situated in the posterior half of the head. Small villiform teeth in narrow bands on jaws and palatines and in a patch on vomer. Seven branchiostegals; gillmembranes very wide, not united, free from isthmus; four gills, gillrakers partly elongate; large pseudobranchiae; opercular bones well developed, horizontal border of praeoperculum sharply serrated or entire. Short postmedian dorsal fin without spines; anal long with a single spine. Caudal forked. Pectorals long, pointed, slender or rather large. Ventrals small, fanshaped, close together, jugular, inserted about below posterior margin of eye, with one spine and five rays. A pneumatic duct present; vertebrae 9 + 22 or 10 + 21; a subocular shelf present.

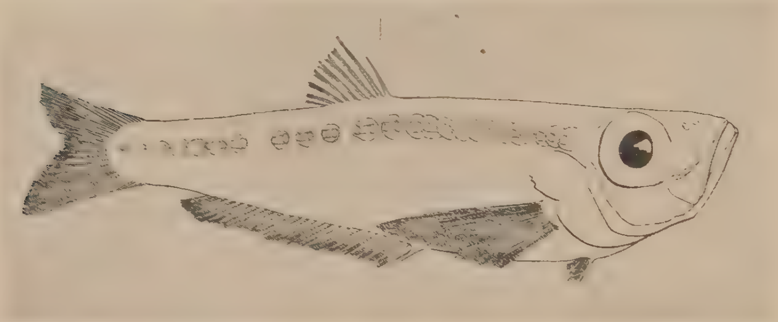

Fig. 36. *Bathyclupea malayana* M. Web. The scales are lost, only the majority of the sensory scales are present. Less than half nat. size.

Distribution: Marine carnivorous fishes of small or medium size, living in tropical seas, known from the indo-australian Archipelago, the Andaman Sea, the Gulf of Bengal and the Gulf of Mexico, in depths from 261—754 m.

Note: The affinities of this group of deep-sea fishes is uncertain; it has been discussed by one of us (Siboga-Exp. Fische 1913, p. 193). *Bathyclupea* has been associated with the *Beryciidae* and with the *Pempheridae*; lately Regan (1913) thinks it probable that it is related to *Lactarius* and Jordan (1923) places the family *Bathyclupeidae* in his Series *Carangiformes*.

1. **Bathyclupea** Alcock.

(A. Alcock, Ann. & Mag. Nat. Hist. (6) VIII. 1891, p. 130. — Descr. Catal. Indian Deep-Sea fishes, 1899, p. 39).

For characters of the single genus known see those of the family.

1. **Bathyclupea malayana** M. Web. [Fig. 36 p. 182].

Bathyclupea malayana M. Weber, Siboga-Exp. Fische, 1913, p. 193.

D. 9; A. I. 26—27; P. 26—27; V. I. 5; L.l. 33—35.

A compressed, elongate fragile fish which in our specimens has lost the scales, only the majority of the sensory scales are present. Dorsal profile from point of snout to base of caudal almost straight, ventral profile between ventrals and anal convex, base of anal more or less straight. Height nearly 4 in length without caudal, head about $3^1/_2$. Eye large, lateral $2^1/_2$—$2^1/_3$ in head. Gape of mouth subvertical; intermaxillary and maxillary together conspicuously longer than diameter of eye. Praeopercular borders entire. Origin of dorsal midway between upper base of caudal and middle of eye; first dorsal ray spine-like. Anal originating nearly half diameter of eye before dorsal and terminates about the length of the eye distant from caudal. Greatest height of caudal peduncle slightly less than half the height of the body. Pectorals triangular, acute, reaching to fifth or sixth ray of anal. Caudal emarginate, the lobes rounded. For other characters see those of the family. Length 240 mm.

Habitat: Flores Sea in 538 and 694 m. depth!.

12. Family CORYPHAENIDAE.

Body adapted for rapid swimming; elongate, compressed, after the juvenile state with a bony crest on frontal part of head, increasing in height with age (see Fig. 39). Scales small, cycloid, firm; lateral line irregularly bent over pectoral, behind it running straight to caudal. Cleft of mouth wide, more or less oblique, the chin slightly prominent. Opercular apparatus entire. Seven branchiostegals; gillmembranes free from isthmus; pseudobranchiae and airbladder absent. Bands of recurved teeth on jaws, vomer and palatines, the outer series on jaws wide-set, two patches of villiform teeth on tongue. A single dorsal, extending from nape nearly to caudal; anal similar but much shorter; both fins without true spines, but some of the anterior rays not articulated. Pectorals falciform, with an oblique base. Ventrals long, slender, close together, partly received into a groove on the abdomen, situated below base of pectorals, which want a scaly process in their axil. Caudal deeply forked, its lobes very long. „Vertebrae 30—33; precaudals without parapophyses, the ribs and epipleurals inserted together on the centra (Regan)".

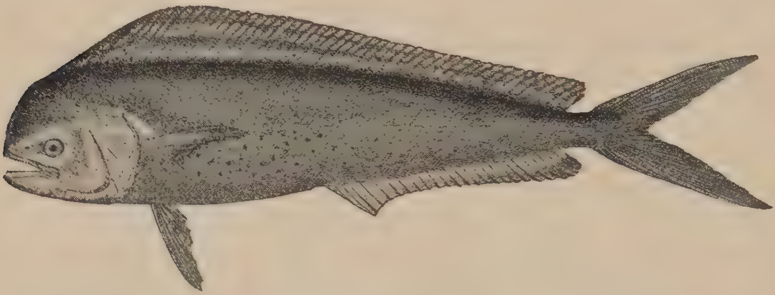

Fig. 37. *Coryphaena hippurus* L. After Jordan & Evermann.

Distribution: large pelagic fishes living on the high seas of all temperate and tropic regions.

1. Coryphaena L.

(Linnaeus, Syst. nat. Edit. X. 1758, p. 261).
Coryphaena Cuvier & Valenciennes, Hist. nat. Poiss. IX. 1833, p. 268.
Lampugus Cuvier & Valenciennes, l. c. p. 317.

For characters of the genus see those of the family.

The very changing characters of the exterior, of head, body, fins and colouration in juvenile, middle aged and fullgrown

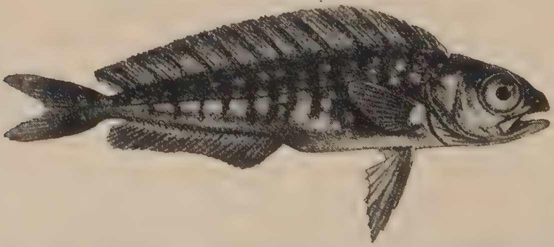

Fig. 38. *Coryphaena hippurus* L. juv. nat. size. In its first phase of metamorphosis. After Lütken.

specimens has the authors induced to create at least two genera: *Coryphaena* and *Lampugus* and a large number of species. Cuvier & Valenciennes quote no less than 19 species. These are reduced by Günther (Catal. Brit. Mus. II 1860, p. 404) and more particularly by Lütken (Spolia atlantica 1880, p. 433) to two and a doubtful third species. They showed that *Lampugus* is the immature state of *Coryphaena* and that the bony crest on the head and the corresponding elevation of the anterior part of the body develope and become higher with increasing age, give the fish a totally different aspect and influence the position and height of the dorsal; this is augmented by the totally different colouration of the young and old specimens.

Only one species is with certainty known from the indo-australian Archipelago, though the occurrence also of *Coryphaena equisetis* L. is possible.

Distribution: that of the family.

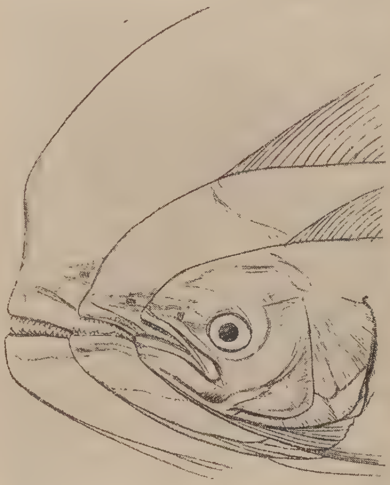

Fig. 39. Three heads of *Coryphaena hippurus* L., to show the change of the physionomy with increasing age (compare text). $^1/_3$ nat. size. After Lütken.

1. **Coryphaena hippurus** L. [Fig. 37, 38, 39, p. 184, 185].

Coryphaena hippurus Linnaeus, Syst. nat. edit. X. 1758, p. 261.

? *Scomber pelagicus* Linnaeus, l. c. p. 299.

Coryphaena fasciolata Pallas, Spicil. Zool. VIII. 1772, Pl. III. fig. 2.

Coryphaena Margravii Cuvier & Valenciennes, Hist. nat. Poiss. IX. 1833, p. 301. — *C. suerii* C. V. l. c. p. 302. — *C. dorado* C. V. l. c. p. 303. — *C. dolfyn* C. V. l. c. p. 305. — *C. argyrurus* C. V. l. c. p. 314.

? *Lampugus pelagicus* Cuvier & Valenciennes, l. c. p. 318.

Coryphaena japonica Schlegel in Temminck & Schlegel, Fauna Japon. Poiss. 1845, p. 120.

Coryphaena hippurus Günther, Cat. Brit. Mus. II. 1860, p. 405.

Lampugus fasciolatus Bleeker, Nat. Tijdschr. Ned. Indië XXI. 1860 p. 66.

Coryphaena Vlamingii Bleeker, Dertiende Bijdr. Borneo, Act. Soc. Sc. Indo-Neerl. VIII. 1860, p. 13.
Coryphaena chrysurus Bleeker, Dertiende Bijdr. Celebes, l. c. p. 40.
? *Coryphaena scomberoides* Bleeker, ibidem.
Coryphaena hippurus Klunzinger, Abh. Zool. bot. Ges. Wien XXI. 1871, p. 446.
Coryphaena hippurus Günther, Fische d. Südsee, Journ. Mus. Godeffroy XI. 1876, p. 146.
Coryphaena hippurus Lütken, Spolia atlantica, Vidensk. Selsk. Skr. (5) XII. 1880, p. 433.
Coryphaena hippurus Steindachner & Döderlein, Fische Japans III. Denkschr. Akad. Wien XLIX. 1884, p. 171.
Coryphaena hippurus Day, Fish. India 4^0, 1878—1888, p. 248.
Coryphaena hippurus Jenkins, Bull. U.S. Fish. Comm. XXII. (1902) 1904, p. 447.
Coryphaena hippurus Jordan & Evermann, Bull. U. S. Fish. Comm. XXIII. (1903) 1905, p. 204.
Coryphaena hippurus M. Weber, Siboga-Expeditie, Fische, 1913, p. 409.
Coryphaena hippurus McCulloch, Check-list fish. N. S. Wales, Australian Zoologist I. 1919, p. 54.
Coryphaena hippurus Barnard, Ann. S. African Mus. XXI. 1925—27, p. 566.
Coryphaena hippurus Fowler, Fish. Oceania, Mem. Bishop Mus. X, 1928, p. 137.

D. 57—64; A. 25—30.

Form and colouration much changing with age. When young, f. i. of 62 mm length 1), (Fig. 38) the body is elongate, slender, the head pointed, slightly convex. Height $5^{1}/_{6}$, head somewhat more than 4 of total length; eye $^{2}/_{5}$ of length of head, its diameter equal to flat, slightly concave interorbital space and also to snout; maxillary reaching to below middle of eye. Dorsal of about level height, which equals half height of head; it originates about above hindborder of praeoperculum. Pectorals $^{1}/_{6}$; ventrals nearly $4^{1}/_{2}$ of length, the last almost reaching anus and inserted below base of pectorals. On the silvery ground-colour appears a series of dark crossbands from head to tail, more separated on lower half of body, more confluent on back, but here separated by some series of light spots. The crossbands are continued on the dorsal fin, less obvious on the anal, as dark stripes, parallel with the rays. With increasing age (Fig. 39) the head grows higher, giving the nape a parabolic form and making finally the rostro-frontal profile nearly vertical by growing an osseous supraorbital narrow crest, forming a blunt angle with the anteriorly elevatad back (see fig. 39). In specimens of 670 to 760 mm length (without caudal) we find the height 4.7—4.25

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1) According to the description of Lütken (l. s. c. p. 490)

in length, the length of head 4.7—4.8, its height about $^1/_7$ shorter than its own length. Eye 5.8—5.9 in head, twice longer than snout, which goes 2.9 in length of head. Maxiliary reaches to below middle of pupil and goes twice in length of head. Dorsal originating above middle of eye, the twelfth and thirteenth ray the highest, gradually decreasing posteriorly; anal of similar structure, with a somewhat concave border. Pectorals falciform, with an obliquely descending base, 6.4—7 in length. Ventrals inserted somewhat behind anterior part of base of pectorals, 6 in length. Caudal deeply forked, more or less than $1^1/_2$ times length of head. In life a brilliant greenish or bluish colour, fading at death into a brownish olive above, whitish below with a silvery or golden hue; in alcohol pale greyish, lighter below with small blackish spots anteriorly and on lower parts. Length up to 1600 mm.

Habitat: Sumatra; Sumba!; Borneo (mouth of river Barito); Celebes (Macassar!, Menado); Ambon. — All tropical and temperate Seas.

Group: CARANGI.

To reduce the taxonomic difficulties in arranging the numerous families and subfamilies of the Perciformes, we unite a number of them in a somewhat artificial group under the name *Carangi*. They seem to be more or less closely related and to be differentiated from a common ancestral stock, which is closely allied with the Serranidae.

This group can be characterized as follows:

Body generally more or less compressed, oblong or elevated, covered with usually small or minute cycloid scales, which may be transformed into lanceolate or linear bodies and sometimes reduced on head and breast. Lateral line more or less complete and arched, either in its entire length or in its anterior part only, in which case its posterior part is straight and armed with bony plates. Mouth of varying size, intermaxillaries not or moderately protractile, maxillaries generally exposed, with or without a supplemental bone. Dentition variable, teeth in most cases small, in villiform bands, often changing with age and even lost. Palate toothed. Praeoperculum in adult entire or its lower margin serrated. Branchiostegals seven; gill-membranes free, not attached to isthmus; pseudobranchiae seldom wanting. Four gills with a slit behind the last. Spinous dorsal less developed than soft dorsal, both are either continuous or separated; the spines generally rather weak, often losing their membrane with age or getting obsolete. Anal long, commonly preceded by two detached spines, which may get obsolete or overgrown by the integument. Usually a procumbent spine before dorsal. Ventrals thoracic or subthoracic, I 5, without a scale-like axillary process. Caudal emarginate. Vertebrae usually 24 (10 + 14) to 26 (10 + 16).

Key to the indo-australian families of Carangi[1]).

A. Dorsal and anal spines present. Body oblong or elongate.
   I. Two spines detached from rest of anal fin, by exception hidden in the skin in adult.

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[1]) The families of the Carangi are numbered — in brackets — in continuation but we have given them also the serial numbers of the families of the Perciformes

1. Praeoperculum entire in adult. Lateral line anteriorly more or less arched, its straight posterior portion usually with armed scutes in its entire length or posteriorly only, usually forming a lateral caudal keel. Teeth in jaws minute, in a single row or in villiform bands. Soft dorsal and anal of equal length or the anal much shorter, both not scaly. . 13. (I) *Carangidae* p. 189.
2. Praeoperculum finely denticulated along its lower margin. Lateral line parallel with dorsal profile, continuous, without scutes or caudal keel. Teeth strong, subequal in a widely set single series, with an inner series of smaller, depressible ones in lower jaw. Soft dorsal and anal of equal length, densely scaly. 15. (III) *Pomatomidae* p. 304.

II. No spines or undivided rays detached from rest of anal fin.

1. Elongate, subcylindrical. Head depressed, without muciferous cavities. Bands of villiform teeth in jaws. Anal shorter than soft dorsal. Two dorsals VI—IX; 3—4, 30—33 . . . . 14. (II) *Rachycentridae* p. 301.
2. Oblong, compressed. Upper surface of head with large muciferous cavities. Jaws anteriorly with permanent canines. Anal longer than soft dorsal. Two dorsals VII—VIII; I. 20—22 . . . . 16. (IV) *Lactariidae* p. 306.

B. Dorsal and anal spines absent in adult. Anal much longer than dorsal. Body strongly compressed, triangular. Scales not visible with naked eye. Mouth small, vertical. Praeoperculum entire. First ventral ray compressed and much produced in adult. . . . . 17. (V) *Menidae* p. 308.

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13. (I). Family **Carangidae**.

Body more or less compressed, oblong or elevated; caudal peduncle slender. Usually covered with small, thin, cycloid scales or naked. Lateral line complete, more or less arched anteriorly, usually either in its entire length armed with scutes or these are restricted to the posterior straight portion only and may be reduced to a few. They may form a bony spinous caudal keel, represented in *Naucrates* by an adipose keel, or the tail unarmed. Head compressed with an occipital, usually trenchant keel. Intermaxillaries mostly somewhat protractile; maxillaries with or without a supplemental bone. Gape of mouth of varying size and direction. Opercular bones thin, smooth, more or less polished, closely fitting. Praeoperculum not connected with the infraorbital bones, usually entire in the adult, in youth (*Carangichthys*) armed with three or more spines. Dentition varying: teeth in jaws minute, in a single series, or less weak and partly in villiform bands; when complete present on vomer, palatines, pterygoids and tongue, but often confined to vomer and palatines, where they even may be wanting or they are in different mode deciduous with age. Gillopenings wide, gillmembranes usually not united, free from isthmus; generally seven branchiostegals; four gills, a slit behind the last; gillrakers usually long; pseudobranchiae commonly present, large, sometimes disappearing with age. Two more or less separate dorsal fins, the spinous fin short, with slender or short spines, usually connected by membrane and depressible in a groove, often preceded by a procumbent spine; the fin sometimes vanishing with age; soft dorsal much longer, equalling the anal, which is preceded by two detached anterior spines, which in the young may be connected. Posterior part of soft dorsal and anal sometimes with one or numerous separate rays (finlets). Pectorals long and falcate or not so and short. Ventrals thoracic, well developed, with a spine and 5 rays. Caudal widely forked, with the bases of the rays embracing to a great extent the hypurals. „Headskeleton and pectoral arch as in the Serranidae. Vertebrae usually 24 (10 + 14) (10+15 in *Naucrates*, 10+16 in *Scombroides*, 10+17 in *Paropsis*) [Regan]".

Distribution: Marine fishes of great or medium size; usually adapted for rapid swimming; pelagic or costal; found in all warm seas, a few penetrating northwards in summer. Most of them are widely distributed, valued as food-fishes and generally distinguished by a metallic and silvery or golden colouration.

Note: In describing the Carangidae of the indo-australian Archipelago one meets the great difficulty, that Bleeker has created a great number of species and described them in the first years of his ichthyological career (1850—1853) and accordingly not with that completeness and carefulness of his later writings. He has never returned to this group of fishes, which is also wanting in his Atlas ichthyologique.

Key to the indo-australian subfamilies of Carangidae[1]).

I. Lateral line armed with scutes, at least posteriorly; more or less arched anteriorly. Pectorals long, falcate. Anal about as long as dorsal, both much longer than abdomen. Maxillary with a supplemental bone . . . . 1. *Caranginae* p. 191.
II. Lateral line without scutes.
    A. Dorsal and anal of equal length, both much longer than abdomen. Pectorals short, not falcate. Maxillary without distinct supplemental bone.
        1. With several finlets behind dorsal and anal; scales ovate, lanceolate or needle-like. 2. *Chorineminae* p. 273.
        2. Without finlets; scales small, rounded. . 3. *Trachinotinae* p. 284.
    B. Anal much shorter than soft dorsal, its base not longer than abdomen. Pectorals short not falcate. Maxillary with a distinct supplemental bone. With or without a single finlet. 4. *Seriolinae* p. 290.

1. Subfam. **Caranginae.**

Oblong, ovate or rhombic, generally strongly compressed. Usually body covered with small cycloid scales, generally also on cheeks, top of head and of opercular apparatus, sometimes reduced on breast; in one genus minute, embedded in the skin; lateral line with an anterior more or less curved part, followed by a straight part with usually keeled scutes, much larger than the other scales. Teeth in jaws, vomer, palatines and tongue in villiform bands, sometimes with an outer row of enlarged conical ones, or reduced to a single series, or dentition in various ways incomplete. Two dorsals, a spinous with normally VIII connected rather weak spines, preceded by a procumbent, more or less subcutaneous spine. In some genera one or more of the posterior rays of dorsal and anal are detached as „finlets". Caudal deeply forked. Pectorals long, falcate; ventrals thoracic I 5.

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1) The genus *Apolectus* C. V., placed by some authors in the family Carangidae, will be described lateron as a member of the family Stromatoideae.

Key to the indo-australian Genera of the Caranginae.

I. One or more finlets behind soft dorsal and anal.
  1. Several finlets behind soft dorsal and anal. . . . . 1. *Megalaspis* p. 192.
  2. One finlet behind soft dorsal and anal . . . . . 2. *Decapterus* p. 194.
II. No true finlets behind soft dorsal and anal.
  A. Dorsal spines VII or VIII, connected by membrane. Scales small but apparent, not embedded in skin, none of the anterior dorsal and anal rays equalling length of body.
    1. Abdomen with a deep median groove, containing vent and detached anal spines and receiving the ventrals . . . . 3. *Atropus* p. 201.
    2. No abdominal groove.
      a. Gillrakers of moderate length and normal shape 4. *Caranx* p. 203.
      b. Gillrakers extremely long, reaching into mouth and featherlike in shape. . . . . 5. *Ulua* p. 266.
  B. Dorsal spines less than VII, rudimentary, not connected by membrane; scales not apparent, embedded in skin; anterior dorsal and anal rays at least equalling length of body . . . . 6. *Alectis* p. 268 1)).

1. **Megalaspis** Bleeker.

(Bleeker, Bijdr. Makreelachtige Visschen, Verh. Batav. Genootschap XXIV. 1852, p. 49 2))).

Head and body somewhat compressed, body oblong-elongate, covered with small scales; anterior part of lateral line

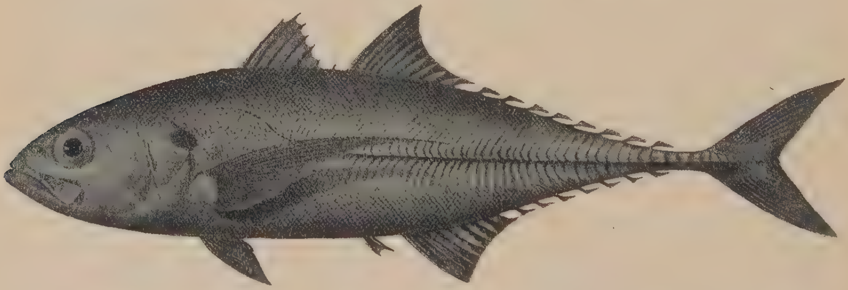

Fig. 40. *Megalaspis cordyla* (L.) After L. Agassiz, see note p. 193. The well developed adipose eyelids are overlooked.

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1) The genus *Carangichthys* Bleeker (Nat. Tijdschr. Ned. Indië III. 1852, p. 760), with the species *C. typus* Blkr. has to be canceled, as it is the juvenile state of many species of *Caranx*, in which the praeoperculum is armed with denticles or spines, which sooner or later disappear.

2) The name *Megalaspis* is for the first time used by Bleeker in Nat. Tijdschr. Ned. Indië II. 1851, p. 213, where he quotes in a list: „*Megalaspis Rottleri* Blkr. = *Caranx Rotleri* C. V.", but he gives no description of his new genus.

shortly arched, straight part with very high scutes, higher than $^1/_3$ of height of body. Caudal peduncle depressed, with a strong keel, therefore broader than high. Adipose eyelids well developed. Teeth small, of equal size in jaws, vomer, palatines and tongue, the mandibulary teeth in a single series, otherwise in bands. Spinous dorsal anteriorly moderately high, preceded by a procumbent spine. Soft dorsal and anal of about equal size with six to ten finlets. Base of connected part of first and second dorsal situated in a scaly groove. Pectorals long, falcate.

Distribution: that of the single species known.

1. **Megalaspis cordyla** (L.) [Fig. 40 p. 192].

Scomber cordyla Linnaeus, Syst. nat. ed. X. 1758, p. 298 (descriptio Linnaei non synonyma)[1]).

Scomber rottleri Bloch, Naturgesch. Ausl. Fische VII. 1793, p. 88. — Ichthyol. X. 1797, p. 39 and 74. — Bloch, Schneider, Syst. ichth. 1801, p. 25.

Scomber rottleri Shaw, Gen. Zool. IV. 2, 1803, p. 598.

Caranx rottleri Rüppell, Reise Nördl. Afrika, Atlas, Fische 1830—31, p. 102. — Neue Wirbelth. Fische 1835, p. 48, 52.

Caranx Rotleri Cuvier & Valenciennes, Hist. nat. Poiss. IX. 1833, p. 29.

Trachurus Rotleri Bleeker, Nat. Geneesk. Arch. Ned. Indië (3) II, 1845, p. 517.

Caranx rottleri Cantor, Journ. Asiat. Soc. Bengal XVIII. 1850, p. 1106.

Megalaspis Rottleri Bleeker, Makreelacht. Visschen, Verh. Batav. Gen. XXIV. 1852, p. 49.

Caranx rottleri Günther, Cat. Brit. Mus. II. 1860, p. 424.

Caranx rottleri Kner, Reise „Novara", Fische 1865—1867, p. 150.

Caranx (Pleiopterus) besselii L. Agassiz, Pisces Celebes, London 1874. Tab. I[2]).

Caranx rottleri Günther, Südsee-Fische II. 1876, p. 130.

Caranx rottleri Day, Fish. India 4⁰, 1878—1888, p. 213.

Megalaspis Rottleri Klunzinger, Fische Roth. Meer. 4⁰, 1884, p. 91.

Megalaspis cordyla Jordan & Evermann, Proc. U. S. Nat. Mus. XXV. 1902, p. 336.

Megalaspis cordyla Fowler, Proc. Acad. Nat. Sc. Philadelphia LVII. 1905, p. 66.

Megalaspis cordyla Evermann & Seale, Bull. Bureau Fish. 26, 1906, p. 65.

Megalaspis cordyla Seale & Bean, Proc. U. S. Nat. Mus. XXXIII. 1908, p. 242.

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1) We agree with Whitley (Records Austr. Mus. XV. 5, 1927, p. 300), that only Linné's own description appertains to his *Scomber cordyla*, not the characters of the wrongly by him quoted synonyma, which belong to an american species now known as *Caranx cordylaoides* (Meuschen). Moreover already Cuvier & Valenciennes (Hist. nat. Poissons IX. 1833, p. 32) have drawn the attention to the fact, that Linné has mixed the american species without finlets with his *Sc. cordyla*, with numerous finlets, by erroneously quoting it as a synonym.

2) We have copied this figure in honour of the famous author, which was published after his decease under the above title by B. Quaritch.

Megalaspis cordyla McCulloch, Biol. Results „Endeavour" III. 1915, p. 139.
Megalaspis cordyla Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 533.
Megalaspis cordyla Whitley, Rec. Austral. Mus. XV. 1927, p. 298. — l. c. XVII. 1929, p. 121.
Megalaspis cordyla Fowler, Fish. Oceania, Mem. Bishop Mus. X, 1928, p. 143.

D.^{1} (I procumbent) VIII; D.^{2} I, 10—11 + 9—7; A. II—I 8—10 + 8—6; L.l. 53—58 scutes.

Subelongate, compressed, the dorsal and ventral contour convex; height about equal to or somewhat more than length of head, which is acute and goes less than 4 times in length. Eye more or less than 4 in head, equal to interorbital space and also to snout or somewhat shorter. Lower jaw prominent, upper reaching to middle of eye. Anterior curvature of lateral line short, terminating below spinous dorsal; the straight portion with 53—58 scutes, the largest $2^1/_2$—3 in height of body, the posterior on the strongly depressed tail with a strong spine. The dorsals distant; the spinous, with the third and fourth spines the longest, is lower than the soft-rayed dorsal, which has 7—9 detached rays. Anal of similar form, but lower, with 6—8 detached rays. Pectorals falciform, longer than head; ventrals reaching about half way the anterior spines of anal. Caudal deeply forked with 17 rays. Colour bluish-green above, on sides and below silvery; a large black opercular spot. Fins yellow: spinous dorsal with a black margin, soft dorsal with dark-tipped rays; upper half of pectoral darker; caudal with a blackish margin. Length over 300 mm.

Nomen indig.: Tetenkel (Malay. Batavia), Panga (Cheribon), Tjenkurengan (Cheribon).

Habitat: Singapore; Sumatra (Benkulen, Padang, Priaman, Bagan Api Api!); Bintang; Banka; Java (Batavia!, Japara, Palabuan Ratu); Borneo (Sinkawang); Bali; Sumbawa; Celebes (Makassar); Batjan; Ceram; Ambon. — Red Sea, Muscat, Zanzibar, Natal, Madagascar, South-Arabia, Gulf of Manaar, Madras, Bay of Bengal, Malay Peninsula, Siam, Honkong, Formosa, Philippines, Queensland, Port Jackson, Samoa, Hawaii. In sea.

2. **Decapterus** Bleeker.

(Bleeker, Nat. Tijdschr. Ned. Indië I. 1851, p. 352. — Verh. Batav. Gen. XXIV. 1852, Makreel. Vissch. p. 49. — Nat. Tijdschr. Ned. Indië VIII. 1855, p. 302 and 417).

Elongate, fusiform, more or less compressed. Head and body covered with small or moderate scales, enlarged in the lateral line, which is slightly arched and passes over below the soft dorsal into the straight part, which is totally or at least in its posterior portion provided with armed scutes. Head rather short, pointed. Conspicuous adipose eyelids present. Lower jaw slightly prominent. Maxillary broadened posteriorly, with a supplemental bone, terminating before or below frontborder of eye. Teeth feeble; when fully developed on jaws, vomer, palatines and tongue. Dorsal fins distant; the spinous anteriorly with a procumbent subcutaneous spine and VIII free spines, the soft dorsal with a spine and 27 to 35 rays. Anal fin with two anterior detached spines and a spine connected with 23—30 rays. Dorsal and anal with a single detached finlet. Pectorals comparatively short, falcate; the shoulder-girdle crossed by a shallow furrow at its junction with the isthmus. Ventrals more or less acute, much shorter than pectorals, originating below base of pectorals. Caudal deeply concave, short, the lobes acute, spreading. About 28—32 long slender gillrakers on lower part of anterior arch.

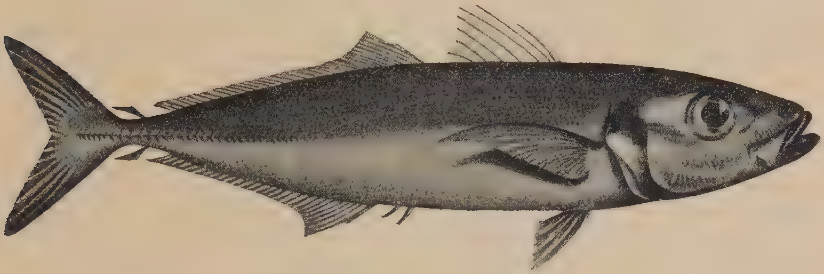

Fig. 41. *Decapterus russelli* (Rüpp.).

Distribution: marine fishes of moderate size; swift swimmers, living in surface water of the tropical and subtropical parts of the Atlantic and Indo-Pacific. Most species widely distributed, some of them reaching in the Atlantic northward to Cape Cod, southward to Brazil; in the Indo-Pacific to southern Japan in the north and to the coast of Natal in the south.

Key to the indo-australian species of Decapterus.

I. Teeth on vomer in two anterior patches; those on tongue at its base only, reduced or totally wanting. Anal with 24—26 rays. About 40 lateral scutes . . 1. *D. russelli* p. 196.

II. Teeth on vomer in a transverse line or arranged in ⊤-form; those on tongue in a narrow median band on the whole tongue or on its base only. 27—30 lateral scutes.

1. Palatines edentulous; vomerine teeth in a transverse line; teeth wanting in upper jaw, those on tongue only in middle of posterior part. Maxillary terminating before eye. Anal with 27—30 rays . . 2. *D. macrosoma* p. 197.
2. Palatines toothed, vomerine teeth arranged in ⊤-or ↑-form.
   - *a.* Maxillary reaching to below frontborder of eye. Palatines with a slender band of teeth, those on tongue in middle of its base. Anal with 23 rays . . . . 3. *D. kurroides* p. 199.
   - *b.* Maxillary reaching to frontborder of eye. Teeth on palatines and on middle of tongue in an elongated slender band. Anal with 27—30 rays 4. *D. lajang* p. 200.

1. **Decapterus russelli** Rüpp. [Fig. 41 p. 195].

Caranx Russellii Rüppell, Atl. Reise nördl. Afrika 1828, p. 99.
? *Caranx kiliche* Cuvier & Valenciennes, Hist. nat. Poiss. IX. 1833, p. 43.
Caranx kurra Cuvier & Valenciennes, l. c. p. 44.
Caranx pseudopterygius Bleeker, Journ. Ind. Archipel. III. (1848) 1849, p. 71.
Decapterus kurra Bleeker, Nat. Tijdschr. Ned. Ind. I. 1851, p. 358. — Makreelacht. Visschen, Verh. Batav. Gen. XXIV. 1852, p. 50.
Decapterus kurra Bleeker, Vischfauna Celebes, Acta Soc. Sc. Indo-neerl. VIII 1860, p. 39.
Caranx kurra Günther, Cat. Brit. Mus. II. 1860, p. 427.
Caranx kurra Klunzinger, Abh. zool. bot. Ges. Wien XXI. 1871, p. 453.
Decapterus Russellii Klunzinger, Fische Roth. Meer. 1884, p. 91.
Caranx ecclipsifer De Vis, Proc. Linn. Soc. N. S. Wales IX. 1884, p. 541.
Caranx russellii Günther, Proc. Zool. Soc. London 1887. p. 660.
? *Decapterus russelli* Steindachner, Denkschr. Akad. Wien LXXI. 1902, p. 142.
Caranx kurra Duncker, Mitt. Nat. Mus. Hamburg XXI, 1904, p. 155.
Decapterus kurra Evermann & Seale, Bull. Bureau fish. XXVI. 1907, p. 63.
Decapterus ? ecclipsifer Ogilby, Proc. Roy. Soc. Queensl. XXIII. 1910, p. 9.
Decapterus Russelli M. Weber, Siboga-Exped. Fische, 1913, p. 393.
Decapterus russellii Ogilby, Mem. Queensl. Mus. III. 1915, p. 59.
Decapterus russelli Wakiya, Ann. Carnegie Mus. XV. 1924, p. 149.
Decapterus russelli Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 534.

D.^{1} (I procumbent) VIII; D.^{2} I, 30—32 + 1; A. II—I, 24—27 + 1; L.l. scutes ca. 40.

Elongate, not much compressed, dorsal and ventral profile equal; height, according to length, 4.5—5.5 in length of body; head 3.4—3.5, bluntly pointed, its ventral profile more convex than the declivous dorsal one; lower jaw slightly longer than the upper; suboperculum distinctly concave, angle of praeoperculum feebly crenulate, opercular membrane in adult sharply serrate. Occiput and interorbital space partly scaly, head otherwise naked. Eye 3.6 to more than 4 in head, the adipose eyelid well developed, overlapping front- and hindborder of pupil; snout much longer than eye, about thrice in head; maxillary strongly dilated, scarcely reaching frontborder of eye; interorbital space convex 1.15 in eye. Minute teeth in jaws, laterally in a single series, the anterior in the upper jaw may be reduced; somewhat larger ones on anterior part of vomer, in two small patches, reduced behind; a villiform narrow band on palatines and on tongue where they may be reduced or even absent. The longer anterior part of lateral line with small, distinct scales, beginning straight, then slightly arched below soft dorsal and descending below its middle to posterior straight part, which contains about 40 more or less distinct keeled scales, continued on base of caudal, the middle ones 4—5 times in height of body. Spinous dorsal high, but lower than height of body, its spines flexible, the second, third and fourth the longest, higher than soft dorsal, the seven anterior rays of which are higher but gradually decreasing in size. Anal of similar form, its third spine situated below sixth or seventh dorsal ray. Dorsal and anal pinnula (finlet) quite apart, longer than posterior connected rays. Pectorals falcate, conspicuously shorter than head, with 21—23 rays; ventrals more than twice in head; caudal widely forked, its lobes obtusely pointed. Vent close to anal spines. Colour greenish-blue above, silvery below; a distinct black opercular spot, fins yellowish or brownish, the anal and ventrals lighter. Length 400 mm [Specimen of *D. kurra* of Bleeker's collection in the Amsterdam Museum seen by us].

Nomen indig. Lajang (Malay. Batavia).

Habitat: Singapore; Java; Celebes (Makassar!); Saleyer!; Ambon. — Red Sea!, Aden, Socotra, Zanzibar, Natal, Madagascar, South Arabia, Muscat, Malay Peninsula, Philippines, Japan, Riu Kiu, Australia (Cape York, Queensland, Moreton Bay, Darnley Island). In sea.

2. **Decapterus macrosoma** Blkr.

Decapterus macrosoma Bleeker, Nat. Tijdschr. Ned. Indië I. 1851, p. 358. — Makreel. Visschen, Verh. Batav. Gen. XXIV. 1852, p. 87.
Caranx macrosoma Günther, Cat. Brit. Mus. II. 1860, p. 425.

Gymnepignathus macrosoma Gill, Proc. Acad. Nat. Sc. Philadelphia 1862, p. 261.
Decapterus macrosomus Evermann & Seale, Bull. Bureau Fish. XXVI. 1907, p. 63.
Decapterus macrosoma Wakiya, Ann. Carnegie Mus. XV. 1924, p. 153.
Decapterus macrosoma Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 535.

D.^{1} (I procumbent) VIII; D^2 I 32—35 + 1; A. II—I 27—30 + 1; L.l. scutes 27—28.

Elongate, scarcely compressed, rather low, its height about 5.5 in body; head somewhat more or less than 4, pointed. Eye 4 to nearly 5 in head, slightly less than interorbital space, and much less than length of snout, which goes thrice in head. Maxillary terminating before frontborder of eye, slightly shorter than mandibulary. Suboperculum with the posterior margin somewhat concave, slightly descending forward; margin of opercular membrane in older specimens finely serrated. Teeth small, wanting in upper jaw, in lower jaw a few only in a single series anteriorly; on vomer anteriorly in a transverse line, palatines edentulous; a narrow band in the middle of posterior part of tongue. Anterior part of lateral line descending in a straight line and scarcely arched below anterior third of soft dorsal; about below the thirteenth dorsal ray it passes over to the straight posterior part with about 60 scales, the posterior 27 or 28 of which are distinct scutes, the highest of which are over half diameter of eye. Spinous dorsal higher than soft dorsal, the second third and fourth spine the longest, but much lower than body; soft dorsal nearly thrice in length. Rayed anal of similar form but shorter. Dorsal and anal finlet slightly longer than last connected rays. Pectorals with 22—23 rays, longer than head without snout. Ventrals less than twice in head. Caudal deeply concave, its lobes acute. Colour greenish above, silvery below, a distinct black opercular spot; fins light. Length 248 mm. [Specimen of Bleekers collection in the Amsterdam Museum seen by us].

Nomen indig.: Lajang (Malay. Batavia).

Habitat: Java; Celebes (Menado); Sangir Islands. — Coasts of Natal, Philippines, Formosa, Bonin Isl., Riu Kiu, Southernmost coast of Japan, Australia in sea.

Note. There seems to be a discrepancy in the counting of the number of scutes. Wakiya and Barnard count 27 to 28; Bleeker p.m. 60, Evermann & Seale 59. Wakiya assumes therefore that the statement made by Bleeker of the number of scutes is not correct. But this is a misunderstanding, originating in the misuse by Bleeker of the word „scutes". Bleeker counts 60 scales in the posterior straight part of the lateral line, which he erroneously calls „scutes". This term ought to be reserved to the „posticis tantum armatis latissimis 6 circiter in altidudine corporis" which he expressly mentions and which correspond to the 27 (28) of Wakiya and Barnard.

3. Decapterus kurroides Blkr.

? *Caránx kiliche* Cuvier & Valenciennes, Hist. nat. Poiss. IX. 1833, p. 43.
Decapterus kurroides Bleeker, Nat. Tijdschr. Ned. Indië VIII. 1855, p. 420.
Eustomatodus kurroides Gill, Proc. Acad. Nat. Sc. Philadelphia 1862, p. 261.

D.^{1} (I procumbent) VIII; D.^{2} I, 29 + 1; A. II—I, 23 + 1; P. 2, 19; V. I, 5; Ll. scutae ± 30.

Elongate compressed, height ca $5^{2}/_{3}$; head acute, $4^{1}/_{2}$ in length; rostro-frontal line declivous, slightly concave. Eye nearly $3^{1}/_{2}$ in head; snout about equal to eye; maxillary slightly shorter than mandibulary, terminating below anterior border of eye, about $2^{1}/_{2}$ in length of head. Teeth in jaws uniserial, small but visible for naked eye; vomerine, palatine and lingual teeth minute; those on vomer in a ↑-band, on palatines on both sides in a slender band, the lingual in middle of base of tongue in a slender band, about twice shorter than tongue. The pectoral triangles scaly on sides and below. Scales small but conspicuous; lateral line arched till slightly before middle of soft dorsal, its curvature weak, posteriorly with about 30 armed scutes, the largest about 4 times in height of body. Spinous dorsal higher, acute, the third spine the longest, about $1^{1}/_{2}$ in height of body; length of soft dorsal about $3^{1}/_{4}$ in length of body; pectorals subfalcate, slightly longer than head, about $4^{1}/_{2}$, acute ventrals about 8; the deeply incised, acutely lobate caudal about 6 in length of body; anterior anal spine longer than posterior; soft anal slightly lower than soft dorsal, about $4^{1}/_{2}$ in length of body. Colour green above, silvery below; snout anteriorly brown; opercle superiorly and posteriorly and axilla with a black spot; fins yellowish or violaceous hyaline. Length of single specimen known 173 mm. [After Bleeker, not seen by us].

Habitat: Ambon, in sea.

Note: The present species is a somewhat doubtful one, as is also the case with *D. kiliche* C. V. from Pondicherry. Day (Fish. India 4° 1878—1888, p. 214) united — with a query — *D. kiliche* with what he called *D. russelli* Rüpp., but what in reality, as demonstrated by Wakiya (Ann. Carnegie Mus. XV, 1924, p. 158), is neither *D. russelli* Rüpp. nor *D. kurra* Blkr., but a different species, named *D. dayi* by Wakiya. — *D. kiliche* C. V. differs from *D. dayi* in the fin-formula and in the number of scutes. In both it agrees fairly well with *D. kurroides* Blkr., as also in its depth and in the length of the head, but there remains an incertainty about the identity of the dentition, which is not referred to by Cuvier & Valenciennes. Steindachner & Döderlein (Denkschr. Akad. Wien XLIX. 1884, p. 185), while describing a japanese fish as *D. russeli*, which in reality is not *D. russelli* Rüppell but *D. maruadsi* (Schlegel) [see also Wakiya l.c. p. 156], quote in their synonymy *D. kurra* Blkr. and *kurroides* Blkr. But Bleeker has already insisted on the discrepancy between these two species, which conspicuously differ in the number of lateral scutes, in the position of their origin, in the number of dorsal and anal fin-rays etc. Both species are quite different of *D. maruadsi*. We are therefore obliged to maintain for the moment *D. kurroides* Blkr. as a proper species, till we can dispose of more material.

4. Decapterus lajang Blkr.

Decapterus lajang Bleeker, Nat. Tijdschr. Ned. Ind. VIII. 1855, p. 302.
Decapterus lajang Günther, Cat. Brit. Mus. II. 1860, p. 425 (note).
Decapterus lajang Wakiya, Ann. Carnegie Mus. XV. 1924, p. 155.
Decapterus lajang Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 535.

D. ^{1} (I procumbent) VIII; D. ^{2} I, 31—34; A. II—I, 27—30 + 1; L.l. scutes 28—30.

Elongate, somewhat compressed, dorsal and ventral profile slightly convex, the ventral more so, its height nearly 6 in body. Head about 4, bluntly pointed, its dorsal profile nearly rectilinear declivous; lower jaw scarcely longer, opercular membrane not serrated. Eye more than $4^1/_2$ in head, equal to interorbital space. Snout longer than eye, thrice in head. Maxillaries reaching to frontborder of eye, their posterior broadened end concave above, inferiorly rounded and produced. Teeth minute, in jaws uniserial, the inferior more conspicuous than the superior, which are perceptible only by touch; on vomer in a T-formed stripe, on palatines and on middle of tongue in an elongate, slender line. Anterior part of lateral line scarcely arched, conspicuously longer than the posterior straight part, which commences below the 15th dorsal ray and contains 28—30 keeled scutes, the highest of which are about one fifth of the height of the body. The spinous dorsal higher than the soft dorsal, the second spine the longest, longer than half height of body. Anal similar to second dorsal but much shorter. The dorsal and anal pinnula (finlet) slightly longer, than last connected rays. Pectorals falculate, equal to head without snout, with about 22 rays. Ventrals acute. Caudal concave, the lobes pointed. Colour bluish-green above, silvery below, a distinct black opercular spot. Length up to 260 mm. [Not seen by us].

Distribution: Ambon; Ternate. — Warmer waters of Japan; South Africa (False Bay).

3. **Atropus** Cuvier.

(Cuvier, Règne anim. II. 1817, p. 324: „Les Atropus" latinized by Oken).

Atropus Wakiya, Ann. Carnegie Mus. XV. 1924, p. 211.

Ovate, strongly compressed; rostro-dorsal profile strongly convex, trenchant; between origin of ventrals and anal a deep

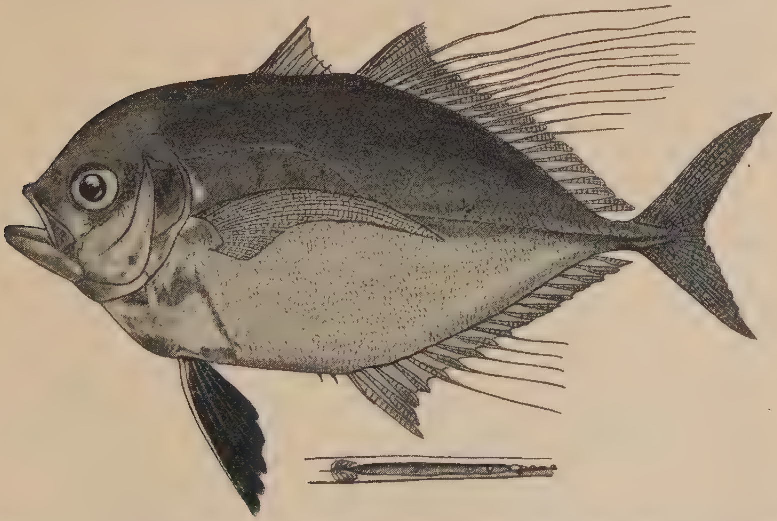

Fig. 42. *Atropus atropus* (Bl. Schn.) $^3/_7$ nat. size. The lower figure shows the median ventral groove which contains the vent, the two praeanal spines and receives the ventrals.

rectilinear longitudinal groove, containing the vent, the two praeanal spines and receiving the ventrals, which are equal or subequal to the head. Scales small, wanting on breast, the naked area extending to base of pectorals and beyond base of ventrals; head naked except superiorly on praeoperculum and operculum and on cheeks. Lateral line strongly arched, becoming straight below fourth or fifth dorsal ray; curved portion more than $1^1/_2$ times shorter than straight portion, rather weakly armed shields along its whole length, the last 30—35 the widest, commencing below last fourth of soft dorsal. Teeth in jaws in villiform bands, in the lower jaw posteriorly reduced to a single row; on vomer in a triangular patch, on palatines and middle of tongue in a slender band. No finlet behind dorsal and anal; first dorsal and anal ray not filamentous, but middle dorsal rays in old males prolonged, slightly so in females.

Distribution: that of the single species known.

1. **Atropus atropus** (Bl. Schn.) [Fig. 42 p. 201].

Brama atropos Bloch, Schneider, Syst. ichth. 1801, p. 98.
Caranx nigripes Cuvier & Valenciennes, Hist. nat. Poiss. IX. 1833, p. 122.
Olistus atropus Cuvier & Valenciennes, l. c. p. 141.
Caranx nigripes Bleeker, Nat. & Geneesk. Arch. Ned. Ind. (3) II. 1845, p. 517 (name only).
Caranx nigripes Cantor, Cat. Malay. Fish. Journ. Asiat. Soc. 1850, p. 1111.
Caranx atropus Cantor, l. c. p. 1112.
Carangoides atropus Bleeker, Nat. Tijdschr. Ned. Ind. I. 1851, p. 366. — Makreel. Vissch. Verh. Batav. Gen. XXIV. 1852, p. 66.
Caranx atropus Günther, Cat. Brit. Mus. II. 1860, p. 450.
Citula atropus Bleeker, Ned. Tijdschr. Dierk. II. 1865, p. 174 (name only).
Caranx nigripes Kner, Fische, Novara-Exp. 1865—1867, p. 159.
Caranx atropus Day, Fish. India 4⁰ 1878—88, p. 221.
Citula atropos Fowler, Journ. Acad. Nat. Sci. Philadelphia (2) XII. 1904, p. 513, Plate XIV, lower figure to left.
Citula atropos Fowler, Proc. Acad. Nat. Sci. Philadelphia (2) LVII. 1905, p. 499.
Caranx longipes Steindachner, Sitzb. Akademie Wien CXV, 1906. p. 1404.
Caranx atropus Jordan & Seale, Proc. Davenp. Acad. Sci. X. (1905) 1907, p. 7.
Caranx atropus Bean & Weed, Proc. U. S. Nat. Mus. XLII. 1912, p. 599.
Citula atropus Jordan & Starks, Ann. Carnegie Mus. XI. 1917, p. 443.
Caranx atropos Fowler & Bean, Proc. U. S. Nat. Mus. LXII. 1922, p. 21 1).
Atropus atropus Wakiya, Ann. Carnegie Mus. XV. 1924, p. 211.

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1) The species is erroneously credited to Forskål as author; Forskål did not describe a species „*atropos*".

D.[1] (1 procumbent) VIII. I 22, D.[2] II. I 18.

Height about twice to 2.5 in length, head nearly 4 to 4.3, much higher than long. Eye about thrice in head, without adipose eyelids; slightly longer than or about equal to obtuse snout; half its diameter equals about greatest height of praeorbital. Lower jaw the longer, the upper reaches to below middle of eye Dorsal spines weak, 4 or 5 times in height of body, lower. than anterior rays of dorsal, the second of which equals $^1/_3$ height of body, the middle ones in old males, slightly so in females, somewhat prolonged into filaments; anal of similar construction. Pectorals falciform, longer than head; ventrals with a weak spine and elongated rays about as long as head; caudal deeply lobed, the lobes equal. Colour bluish green above, silvery below, vertically banded in young, without an opercular spot, which is conspicuous in older age; ventrals black, the other fins hyaline, the anterior dorsal and anal rays dusky. Length up to 300 mm. [Specimen of BLEEKER's collection in the Amsterdam Museum seen by us].

Nom. indig: Kuweh (Malay. Batavia); Pettah (Surabaja), Damong (Banjuwangi); Romahar betine (Serawak).

Habitat: Singapore; Penang; Sumatra (Priaman, Bagan Api Api!); Java (Batavia!, Japara); Madura; Bali; Borneo (Serawak). — British India, Ceylon, Siam, China (Honkong, Chefoo), Formosa, Samoa. In sea.

4. **Caranx** Lacépède.

(Lacépède, Hist. nat. Poissons III. 1802, p. 57).

Head and body oblong-elongate or ovate, more or less compressed, covered with small but generally conspicuous scales; anterior part of lateral line more or less arched, by exception undulating and nearly straight, posterior part straight, at least in its posterior portion, with more or less armed scutes. Breast entirely scaled or naked in different degree. Dentition variable; when complete with one or more series of small or moderate teeth in jaws; present on vomer, palatines and tongue. Gillrakers of moderate length and of normal shape. First dorsal with VII to VIII spines, connected by membrane; soft dorsal and anal often anteriorly elevated or forming a falcate lobe; some of the rays may be filamentous and prolonged but never equalling length of body; caudal with spreading, acute lobes; pectorals long, falcate; ventrals usually much shorter than head, never received in a ventral median groove; shoulder-girdle usually not crossed by a furrow at its junction with the isthmus. No finlets behind soft dorsal and anal.

Distribution: Marine fishes of moderate, some of large size, living in surface water of tropical, subtropical and temperate seas, some entering mouth of rivers. Most of them valued food-fishes.

Key to the indo-australian subgenera of Caranx.

- I. Dentition complete, sometimes wanting on tongue.
  - 1. Teeth small, equal, in jaws uniseriate, in upper often pluriseriate anteriorly; present on vomer, palatines and usually on tongue. Breast scaled; anterior part of lateral line variable, posterior part at least posteriorly with armed scutes. None of the soft rays produced into filaments. Shoulder-girdle usually crossed with a deep furrow at its junction with the isthmus . . . . 1. *Selar* p. 205.
  - 2. Jaws, at least anteriorly, with a pluriseriate (villiform) band of small teeth, by exception some of the anterior outer teeth are somewhat stronger; teeth present on vomer, palatines and tongue. Breast scaled or in different degree ventrally and laterally naked; anterior part of lateral line moderately curved, armed scutes on posterior portion of straight part. Anterior rays of soft dorsal and anal in adult more or less elevated; none of the rays filamentous . . . . 2. *Carangoides* p. 220.
  - 3. Teeth in upper jaw in a villiform band, with an outer series of stronger ones; in the lower a single series of middle-sized teeth, the 2 or 4 anterior more or less caniniform; present on vomer, palatines and tongue. Breast entirely scaled or at least ventrally naked with a small median patch of minute scales; lateral line anteriorly arched, posterior straight part with armed scutes. Anterior rays of soft dorsal and anal forming a falcate lobe; no produced filaments . . . . 3. *Caranx* s. str. p. 242.
- II. Acute, curved teeth in upper jaw in two, in lower posteriorly in one series, or in both in a single or in two series; none on vomer, palatines and tongue. 4. *Uraspis* p. 260.
- III. Upper jaw not toothed.
  - 1. A single series of minute teeth on lower jaw and more or less rudimentary ones on tongue. 5. *Selaroides* p. 261.
  - 2. Teeth wanting, at least already in specimens less than 100 mm. . . . . 6. *Gnathanodon* p. 263.

Note: In this artificial systematisation of the numerous species of *Caranx*, we have maintained the genus *Carangoides* of Bleeker as subgenus in the original interpretation of Bleeker, just as f.i. Klunzinger did. We have accordingly laid the principal stress on the dentition but eliminated on other grounds from Bleeker's systematisation the genera *Atropus* Lac. and *Alectis* Raf. Wakiya separates from *Carangoides* the subgenus *Citula* Cuv. the first with a scaly, the second with a naked breast. But this difference will not stand the test, as there are transitions in this character. This is also the case with the second character, mentioned by him, that in *Citula* the soft dorsal and anal are falcate anteriorly as f.i. *C. ferdau* (Forsk.), called by Wakiya *Carangoides*, has also in old specimens an anterior dorsal and anal falcate lobe.

1. Subgenus **Selar** Bleeker.

(Bleeker, Nat. Tijdschr. Ned. Ind. I. 1851, p. 352. -- Makreel. Visschen, Verh. Bat. Gen. XXIV. 1852, p. 50).

Oblong, elongate, much or slightly compressed; head pointed, lower jaw prominent or both jaws subequal; adipose eyelid well developed. Teeth small, even, uniseriate in jaws, in upper jaw often pluriseriate anteriorly; on vomer, palatines and usually also on tongue persistent. Breast scaled. Anterior part of lateral line strongly or moderately arched or it is scarcely arched and descends to posterior straight part which has usually in its whole length or only in its posterior portion armed scutes. Soft dorsal and anal low, not much elevated anteriorly, little if at all falcate; none of the rays produced

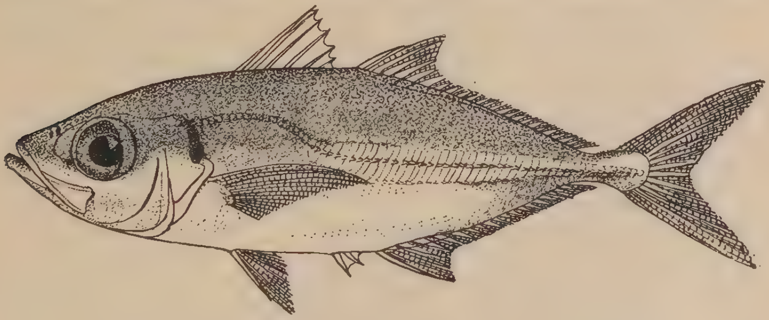

Fig 43. *Caranx* (*Selar*) *boops* C. V. $^5/_9$ nat. size.

into a filament. Shoulder-girdle crossed with a deep furrow at its junction with the isthmus (*Selar* modern authors) or not crossed (*Atule* Jordan & Jordan).

Key to the indo-australian species of the Subgenus Selar.

I. Last dorsal and anal ray finlet-like a little separated. Anterior part of lateral line weakly arched, nearly equal to posterior straight part, beginning below 6. to 8. dorsal ray, with 40—45 scutes, the broadest of which 6 to 7 times in height of body. . . . . 1. *S. mate* p. 207.

II. Last dorsal and anal ray not finlet-like seperated.

A. Eye thrice or less or slightly more in head, with a broad posterior and narrow anterior eyelid. Upper border of operculum with a rounded incision.

1. Anterior part of lateral line nearly straight, strongly bent downwards to below opposite last dorsal spine, thrice shorter than straight posterior portion, with 44—46 large scutes . . . . . 2. *S. boops* p. 209.

2. Anterior part of lateral line scarcely arched, the shielded part commences below 8. to 10. dorsal rays, but the 33—38 keeled scutes under middle of soft dorsal. . . . . 3. *S. crumenophthalmus* p. 210.

B. Eye 3.5 to 5 in head, posterior adipose eyelid broad or narrow. Opercular border entire.

1. Lateral line anteriorly strongly arched to below origin of soft dorsal; the straight posterior portion with 50 to 60 scutes.

a. About 60 scutes, the broadest about 8 times in height of body. Shielded part of L.l. conspicuously less than twice the arched part. Maxillary terminating before eye. Ventral profile subcarinate . . . . 4. *S. macrurus* p. 213.

b. About 48—56 scutes, the broadest 9 to 10 times in height of body. Shielded part of L.l. about twice the arched part. Maxillary terminating below anterior part of eye. Ventral profile subcarinate . . . . . . 5. *S. malam* p. 213.

c. In maximo 58 scutes, the broadest about 4 times in height of body.

Shielded part of L.l. about twice the arched part. Maxillary terminating below first third of eye . . . . . 6. *S. djedaba* p. 214.

2. Lateral line anteriorly moderately arched to below 4. to 6. dorsal ray, twice shorter than straight portion with 40—60 scutes.
   - *a.* Broadest scutes 6—7 times in height of body. Ventral profile much more convex and trenchant. Maxillary terminating below first third of eye . 7. *S. kalla* p. 216.
   - *b.* Broadest scutes about 4 times in height of body. Ventral and dorsal profile evenly convex. Maxillary terminating slightly behind front-border of eye . . . . 8. *S. megalaspis* p. 219.

Doubtful species

9. *S. microchir* p. 219.

1. **Caranx (Selar) mate** C. V.

Caranx mate Cuvier & Valenciennes, Hist. nat. Poiss. IX. 1833, p. 54.
Caranx xanthurus Cuvier & Valenciennes, l.c. p. 55.
Caranx affinis Rüppell, Neue Wirbelth. Fauna Roth. Meer. 1835, p. 49.
Caranx mate Cantor, Journ. Asiat. Soc. Bengal XVIII. 1850, p. 1107.
Selar Hasseltii Bleeker, Nat. Tijdschr. Ned. Indië I. 1851, p. 359. — Verh. Bat. Gen. XXIV. 1852, Makreelacht. Visschen p. 53.
Caranx hasseltii Günther, Cat. Brit. Mus. II. 1860, p. 430.
Caranx xanthurus Günther, l.c. p. 434.
Caranx affinis Kner, Reise „Novara" Fische 1865—67, p. 151.
Caranx hasselti Playfair, Fish. Zanzibar, 1866, p. 59.
Caranx mate Day, Proc. Zool. Soc. London 1870, p. 689.
Caranx affinis Klunzinger, Abh. zool.-bot. Ges. Wien XXI. 1871, p. 459.
Caranx affinis Day, Fish. India 4° 1878—88, p. 219.
Caranx affinis Steindachner, Ichthyol. Beitr. X. Sitzb. Akad. Wien LXXXIII. 1881, p. 211.
Caranx (Selar) affinis Klunzinger, Fische Roth. Meer. 1884, p. 97.
Caranx hasseltii M. Weber, in Semon Zool. Forschungsreisen V. 1895, p. 266.
Carangus politus Jenkins, Bull. U. S. Fish. Comm. XXII. (1902) 1904, p. 445 (fide Fowler).
Carangus affinis Jenkins, l. c. p. 446.
Caranx mate Fowler, Journ. Acad. Nat. Sc. Philadelphia (2) XII. 1904, p. 510. — Proc. Acad. Nat. Sc. Philadelphia LVII. 1905. p. 74.
Carangus politus Jordan & Evermann, Bull. U. S. Fish. Comm. XXIII. (1903) 1905, p. 194.
Carangus affinis Jordan & Evermann, l. c. p. 195.
Decapterus lundini Jordan & Seale, Bull. Bureau Fish. XXV. (1905) 1906, p. 229 (fide Fowler).
Caranx affinis et hasselti Jordan & Seale, l. c. p. 232.
Caranx affinis Evermann & Seale, o. c. XXVI. 1906, p. 64.
Caranx affinis McCulloch, Biol. Results „Endeavour" III. 1915, p. 130.

Caranx mate Fowler & Bean, Proc. U. S. Nat. Mus. LXII. 1922, p. 19.
Caranx affinis lundini Nichols, Am. Mus. Novit. 1922, n° 50, p. 1.
Caranx (*Atule*) *affinis* Wakiya, Ann. Carnegie Mus. XV. 1924, p. 200.
Atule lundini Jordan & Jordan, Mem. Carnegie Mus. X. 1922—25, p. 38.
Caranx affinis Vinciguerra, Ann. Mus. Civ. Genova L. 1926, p. 561.
Selar affinis Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 538.
Caranx mate Fowler, Fish. Oceania, Mem. Bishop Mus. X. 1928. p. 145.

D. ^{1} (I procumbent) VIII. I 23—24; A. II. I 19—21; P. 21—23.

Oblong compressed, dorsal and ventral profile equally convex, belly not carinate. Height about 3.5 in length, head somewhat shorter, acute, longer than high, its rostro-frontal line declivous and somewhat convex. Eye 3.5—4 in head, situated for the greatest part in its anterior half; adipose eyelids extending on pupil; interorbital space somewhat more. Snout equal to or longer than eye, rather pointed. Lower jaw prominent, maxillary terminating in young before, in old below anterior border of eye. Small, conspicuous teeth in jaws, in a single series, or the upper anterior ones in a narrow band; villiform on vomer and in a band on palatines and tongue. Breast totally scaled; also scales on cheeks and superior part of opercles. Lateral line anteriorly weakly arched, terminating below about 6th to 8th dorsal ray, wherefrom begins the straigth portion of nearly equal length, with 40—45 scutes, increasing in size posteriorly; the posterior strongly armed, 6—7 times in height of body. Dorsal fins of equal height, more than twice lower than body, but higher than anal; anterior dorsal and anal rays not much elevated; last dorsal and anal ray longer than the preceding and finlet-like. Spinous dorsal with a low basal scaly sheath, which is well developed on soft dorsal and anal. Pectorals falcate, longer than head, reaching origin of soft anal. Ventrals twice shorter than head. Caudal with acute lobes, equal, about 5 times in length. Colour slaty above, with indications of darker transverse bands, silvery or whitish below; a large dark blotch on opercle and upper part of shoulder-girdle. Length 270 mm.

Habitat: Singapore; Penang; Banka; Sumatra (Padang); Java; Bali; Flores!; Borneo (Serawak); Celebes (Makassar, Badjoa); Batjan; Ambon; Halmaheira; Waigeu!; New Guinea (Doreh). — Red Sea, Natal coast, Madagascar, Seychelles, Muscat, British India Ceylon, Andamans, Tonkin, Riu Kiu Islands; Formosa, Philippines, Northwestern Australia, Hawaiian Islands, Sandwich Islands. In sea.

2. **Caranx (Selar) boops** C. V. [Fig. 43 p. 205].

Caranx boops Cuvier & Valenciennes, Hist. nat. Poiss. IX. 1833, p. 46.
Selar boops Bleeker, Verh. Batav. Gen. XXIV. 1852, Makreelacht. Visschen p. 51.
Caranx boops Günther, Cat. Brit. Mus. II. 1860, p. 431.
Caranx boops Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 235.
Caranx boops Day, Fish. India 4⁰ 1878—88, p. 218.
Caranx boops Karoli, Termeszetrajzi füzetek V. 1882, p. 14.
Caranx boops Macleay, Proc. Linn. Soc. N. S. Wales VIII. 1883, p. 266 (wrongly written *boofs*).
Caranx boops Meyer, Anal. Soc. Esp. Hist. Nat. XIV. 1885, p. 24.
Trachurops crumenophthalmus Seale, Occ. Papers, Bishop Mus. IV, 1906, p. 30 (nec Bloch) fide Fowler.
Caranx boops Evermann & Seale, Bull. Bureau Fish. XXVI. (1906) 1907, p. 63.
Caranx boops M. Weber, Siboga-Exped. Fische 1913, p. 395.
Caranx boops de Beaufort, Bijdr. Dierk. Leiden 1913, p. 132.
Caranx boops McCulloch, Biol. Results "Endeavour" III. 1915, p. 138.
Selar boops Fowler, Proc. Acad. Nat. Sc. Philadelphia LXX. 1918, p. 15.
Selar boops Fowler, Fish. Oceania, Mem. Bishop Mus. X, 1928, p. 144.
Caranx boops Duncker & Mohr, Mitt. Zool. Mus. Hamburg 44, 1929, p. 79.

D. ^{1} (I procumbent) VIII; D. ^{2} I 24—25; A. II. I. 20—21; P. 19—20.

Oblong-ovoid, dorsal and ventral profile equally convex, belly not carinate; height about 3.10 in length; head 3.25–3.45, acute, longer than high, rostro-frontal line declivous, nearly straight. Eye 3 or somewhat less in head; its diameter about $^1/_5$ longer than slightly convex interorbital space which is about equal to pointed snout; posterior adipose eyelid well developed reaching to inner border of pupil, the anterior eyelid much shorter. Lower jaw somewhat prominent, the upper terminating below anterior third of eye; posterior border of operculum with a rounded incision, filled up with a dark-coloured membrane. Shoulder-girdle crossed by a furrow at its junction with the isthmus. Teeth small, equal, in jaws in a single series, forming a band near symphysis of upper and lower jaw; two patches on vomer and a band on palatines and tongue. Gillrakers on lower part of first branchial arch about 23. Covered with moderate scales also on breast, cheeks, postorbital streak and operculum; lateral line with a short, nearly straight anterior portion which is about opposite the last dorsal spine, strongly bent downwards, to the straight posterior portion, which is nearly thrice longer than the anterior portion and is covered by 44—46 large plates, the highest of which are $^1/_4$ of height of body. Dorsal spines weak, the second, third and fourth of about equal length and somewhat more than half length of head, slightly longer than first dorsal rays and conspicuously longer than first anal rays. Soft dorsal and anal with a basal scaly sheath. Pectorals falciform, less than head, reaching midway between free anal spines and commencement of soft anal. Ventrals half length of head. Caudal deeply forked. Colour silvery, back darker, a small opercular dark spot, axil of pectoral dark; dorsal and caudal more or less finely spotted. Length 240 mm.

Habitat: Singapore; Billiton; Nias!; Sumatra (Tiku, Trussan); Java (Batavia); Celebes (Makassar, Badjoa); Buton!; Batjan; Ternate; Ambon; Saparua; Obi major!; Waigeu!; New Guinea. — Andamans, Philippines, Australia (Cape York), Neu Pommern, Solomon Isl., New Hebrides. In sea.

3. **Caranx (Selar) crumenophthalmus** (Bl.).

Scomber crumenophthalmus Bloch, Ausl. Fische VII. 1793, p. 77, tab. 343.
Scomber Plumieri Bloch, l.c. tab. 344. — Bloch, Schneider, Syst. ichth. 1801, p. 30.
Scomber balantiophthalmus Bloch, Schneider, Syst. ichth. 1801, p. 29.
Caranx daubentonii Lacépède, Hist. nat. Poiss. III. 1802, p. 59, 71.
Caranx crumenophthalmus Lacépède, o.c. IV. 1802, p. 107.
Caranx mauritianus Quoy & Gaimard, Voy. Freycinet Zool. 1824, p. 359.
Caranx macrophthalmus Rüppell, Atl. Fische Nördl. Afrika, 1828, p. 97.
Caranx macrophthalmus Agassiz in Spix, Pisc. Brasil. 1829, p. 107.
Caranx mauritianus Cuvier & Valenciennes, Hist. nat. Poiss. IX. 1833, p. 60.
Caranx Plumieri Cuvier & Valenciennes, l. c. p. 65.
? *Caranx torvus* Jenyns, Zoology, Voy. Beagle 1842, p. 69 [1]).
Selar torvus Bleeker, Nat. Tijdschr. Ned. Indië II. 1851, p. 213, 227. — Verh. Batav. Gen. XXIV. 1852, Makreelacht. Vissch. p. 51 (nec Jenyns?)
Caranx crumenophthalmus Günther, Cat. Brit. Mus. II. 1860, p. 431.
Caranx macrophthalmus Klunzinger, Abh. zool. bot. Ges. Wien XXI. 1871, p. 458.
Caranx crumenophthalmus Günther, Fische Südsee II. 1876, p. 131.
Trachurops mauritianus Streets, Bull. U. S. Nat. Mus. 1877, p. 68.
Caranx crumenophthalmus Day, Fish. India 4^0 1878—1888, p. 217.
Caranx (Selar) *macrophthalmus* Klunzinger, Fische Roth. Meer. 1884, p. 97.
Caranx crumenophthalmus Sauvage, Poissons Madagascar 1891, p. 327.
Caranx (Selar) *macrophthalmus* Pfeffer, Jahrb. Hamburg. wissensch. Anstalt. X. 1893, p. 12.
Caranx macrophthalmus Picaglia, Atti Soc. Modena (3) XIII. 1894, p. 30.
Caranx crumenophthalmus Jordan & Evermann, Fish. North America 1896, p. 911.

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1) Waite (Mem. Austral. Mus. III. 1899, p. 189) quotes *C. torvus* Jenyns as a synonym of *C. crumenophthalmus* Bloch; Jordan & Seale, Fishes of Samoa (Bull. Bur. Fisheries XXV. (1905) 1906), say: „There is apparently no difference between *Trachurops torva* and the common *T. crumenophthalma* of the Atlantic.”

Trachurops torva Jordan & Evermann, Proc. U. S. Nat. Mus. XXV. 1902, p. 337 (nec Jenyns?).

Trachurops crumenophthalma Jordan & Evermann, Bull. U. S. Fish. Comm. XXIII (1903) 1905, p. 187.

Trachurops crumenophthalmus Fowler, Proc. Acad. Nat. Sc. Philadelphia LVII. 1905, p. 69.

Trachurops crumenophthalma Jordan & Seale, Fish. Samoa, Bull. Bur. Fisheries XXV. (1905) 1906, p. 230. — o.c. XXVI. (1906) 1907, p. 13.

Caranx macrophthalmus de Beaufort, Bijdr. Dierk. Leiden 1913, p. 132.

Caranx macrophthalmus M. Weber, Siboga-Exp. Fische 1913, p. 398.

Selar crumenophthalmus Fowler, Proc. U. S. Nat. Mus. LVI. 1919, p. 209.

Selar mauritianus D. St. Jordan & E. K. Jordan, Mem. Carnegie Mus. X, 1922, p. 38.

Trachurops mauritiana Jordan & Hubbs, l.c. 1922—25, p. 223.

Trachurops mauritiana E. K. Jordan, Proc. U. S. Nat. Mus. LXVI. 1925, p. 18.

Selar mauritianus et *macrophthalmus* Wakiya, Ann. Carnegie Mus. XV. 1924, p. 159, 160.

Selar crumenophthalmus Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 536.

Selar crumenophthalmus Fowler, Fish. Oceania, Mem. Bishop Mus. X, 1928, p. 144.

D.^{1} (I procumbent) VIII; D.^{2} I. 23—26; A. II. I 21—23.

Elongate, dorsal and ventral profile about equally convex. Height 3.3—3.8, 4.25—4.75 in length with caudal; head 3—3.25, 3.75 to nearly 4 in length with caudal. Profile of head nearly straight. Eye thrice or somewhat more or less in head, with a broad posterior and a narrower anterior adipose eyelid; its diameter equal to pointed snout or nearly so and more than interorbital space. Maxillary reaching to below frontborder or nearly to below centre of eye. Lower jaw the longer. The fine teeth in the jaws in a single series; the anterior in the upper jaw may be in 2 or 3 series, forming a narrow band; teeth weaker on vomer; in a narrow band on palatines and along middle of tongue. Upper part of posterior border of operculum with an incision. Scaly, also on chest and cheeks. Lateral line scarcely curved, the shielded part commences below eighth or tenth dorsal ray, but the keeled scutes begin about under the middle of the second dorsal and count 33 to 38, according to age; height of largest scutes about thrice their length. Dorsal spines moderate, the third and fourth the longest, about twice in length of head; higher than soft dorsal, which has no detached finlets and equals the somewhat shorter anal; both fins with a low scaly sheath. Pectorals falcate, about 1.25 in head. Ventrals small, barely reaching vent. Caudal small, rather deeply forked. A deep longitudinal furrow at the junction of the shoulder girdle with the isthmus. Gillrakers 23—27 on lower part of anterior arch. Colour bluish silvery above, lighter below; opercular spot very faint or even wanting. Length up to 300 mm. [Specimens of BLEEKER's collection in the Amsterdam Museum seen by us].

Habitat: Sumatra (Telokbetong, Trussan, Siboga); Pulu Weh!; Nias!; Java (Batavia); Bali; Lombok!; Sumbawa; Celebes (Makassar, Bulucomba, Badjoa, Menado); Batjan; Ambon!; Saparua; Banda; Ternate; Halmaheira; Obi major!; Gisser!; Ceram!; Waigeu!; Sulu!; Kei Islands!. — Red Sea, Zanzibar, Natal coast, Madagascar, Bourbon, Mauritius, Isle de France, Seychelles, South Arabia, Muscat, British India, Nikobars, China, Japan, Formosa, Philippines, Solomon Isl., New Hebrides, Marquesas Isl., Rarotonga, Paumotu Isl., Sandwich Isl., Admirality Isl.. — Circumtropical; in sea.

Note. The history of this species is a complicated one, more so by neglect by many authors of the memoir of Sauvage about the fishes of Madagascar (1891) who had the occasion to compare in the Paris Museum the types of Cuvier & Valenciennes and of Quoy & Gaimard. There are two points of special interest. Wakiya, the latest author about east-asiatic Carangidae, distinguishes *crumenophthalmus* (Bl.) from *mauritianus* Q.G. and reserves the first name for the atlantic, the second name for the indopacific species, which is better known under the later name *macrophthalmus* Rüppell. He has overlooked, that Sauvage interprets them as identical, that the differences explained by Klunzinger do not stand the test, that Jordan & Evermann, who gave a description of the atlantic *crumenophthalmus*, describe it also from Hawaii and that Fowler, while describing it from West-Africa, says: "a comparison of scales and other characters, as gill-rakers, radii, scutes etc. reveals no distinctions other than individual, in examples from the Philippines and Hawaiian Islands." The majority of later authors take therefore the atlantic and indo-pacific species to be identical. — An other question is, that the name *C. crumenophthalmus* does appear in the numerous papers of Bleeker only in lists of fishes from Guinea, Madagascar, Mauritius and China, all taken from other authors; he never mentions it from the Archipelago, whereas he quotes in many places *C.* (*Selar*) *torvus* Jenyns as an inhabitant of the Archipelago. Setting aside the question if his *C. torvus* is identical with *C. torvus* Jenyns, which is probable, we presume that he did not recognise the identity of what he called *torvus* with *crumenophthalmus* Bloch and *macrophthalmus* Rüppell, which he likewise does not mention from the Archipelago.

4. **Caranx (Selar) macrurus** Blkr.

Selar macrurus Bleeker, Nat. Tijdschr. Ned. Indië, I. 1851, p. 359. — Verh. Bat. Gen. XXIV. 1852, Makreelacht. Visschen, p. 52.

Caranx macrurus Günther, Cat. Brit. Mus. II. 1860, p. 434.

Alepes glabra Fowler, Fishfauna Sumatra, 1904, p. 507. Journ. Acad. Nat. Sc. (2) XII. 1902—1904.

D. ^{1} (I procumbent) VIII. D.^{2} I. 24—27; A. II. I. 20—22; P. 21; Scutae lat. ca. 60.

Oblong, compressed, dorsal and ventral profile regularly and equally convex; belly subcarinate. Height somewhat more than 4 in total length; head about $5^1/_2$, acute, longer than high; rostro-frontal line declivous and nearly straight. Eye 4 times in head, situated in its anterior half, with a broad posterior adipose eyelid. Lower jaw prominent, the upper terminating before eye. Breast totally scaly. Lateral line strongly arched till below origin of soft dorsal; from there with more or less than 60 strongly armed scutes, the broadest about 8 times in height of body. The straight posterior part less than twice the length of the arched part. Minute, conspicuous teeth in a single series in jaws; also on vomer, palatines and tongue. Fins acute, without produced rays; dorsals and anal of equal height, thrice in height of body; anal spines small, the posterior the longest. Caudal with very acute curved lobes, the superior the longest, $3^1/_2$ in length of body. Pectorals falcate, much longer than head; ventrals half length of head. Colour above bright blue, silvery below; a diffuse brown opercular spot; second dorsal and caudal with a black margin. Length up to 410 m̊m. [After BLEEKER; not seen by us].

Habitat: Sumatra (Telokbetong, Padang); Java (Batavia); Celebes (Makassar). In sea.

5. **Caranx (Selar) malam** Blkr.

Selar malam Bleeker, Nat. Tijdschr. Ned. Indië I. 1851, p. 362. — Verh. Batav. Gen. XXIV. 1852, Makreelacht. Visschen p. 55.

Caranx malam Günther, Cat. Brit. Mus. II. 1860, p. 434.

Caranx malam Kner, Reise „Novara" Fische, 1865—1867, p. 154.

Caranx nigripinnis Day, Fish. India 4^0 1878—1888, p. 225.

Alepes melanoptera Fowler, Journ. Acad. N. Sc. Philadelphia (2) XII, 1904, p. 507.— Proc. Acad. N. Sc. Philadelphia, 1905, p. 70.

Caranx malam Bean & Weed, Proc. U. S. Nat. Mus. 42, 1912, p. 600.
Caranx malam M. Weber, Siboga-Exp. Fische 1913, p. 397.
Caranx malam McCulloch, Biol. Results „Endeavour" 1915, p. 131.
Caranx (*Atule*) *malam* Wakiya, Ann. Carnegie Mus. XV. 1924, p. 200.

D.^{1} (I procumbent) VIII; D.^{2} I 23—24; A. II. I 20—21; P. 20—22; Scutes 50—56.

Oblong, compressed, dorsal and ventral profile equally convex, belly not or only slightly trenchant. Height 2.8—3 in length; head 3.8—4, almost as long as high, its rostro-frontal line convex. Eye about 3.5 in head, nearly totally in anterior half of head, about equal to obtuse snout, somewhat less than interorbital space; posterior adipose eyelid broad. Jaws nearly equal; maxillary terminating below anterior part of eye. Lateral line strongly arched in its anterior part which is little less than half the length of the straight posterior part, beginning below origin of soft dorsal and counting 48—56 scutes, the posterior of which are strongly keeled and go 9 to 10 times in height of body. Spinous dorsal and anal somewhat lower than soft dorsal, fourth dorsal spine the longest, anterior dorsal and anal rays a little longer than the sequent; caudal deeply forked. Pectorals falcate in young, shorter in old, longer than head, far surpassing vertical through origin of anal. Ventrals about twice in head, the vent being situated between their ends. Breast totally scaly, few scales on cheeks and opercle. Teeth in jaws small but very conspicuous, in a single series; minute on palatines and tongue, a few on vomer. Colour darkish green or brown above, lighter below; a distinct black opercular spot; spinous dorsal dusky or blackish; lobes and margin of caudal blackish; there may be more or less pronounced traces of 6 to 9 dark bands descending from back to lateral line. Length more than 200 mm. [Specimen of BLEEKER's collection in the Museum of Amsterdam seen by us].

Habitat: Singapore; Riouw Archipelago; Sumatra (Padang, Priaman, Trussan, Bagan Api Api!); Banka; Java (Batavia!, Tandjong Priok!); Semarang!; Borneo (Singkawang); Celebes (Makassar!). — British India, Andamans, Siam, China, Formosa, Queensland; in sea.

6. **Caranx (Selar) djedaba** (Forsk.).

Scomber djedaba Forskål, Descr. animal. 1775, p. 56.
Caranx djeddaba Rüppell, Reise Nördl. Afrika, Atlas, Fische 1830—31, p. 97.
Caranx vari Cuvier & Valenciennes, Hist. nat. Poiss. IX. 1833, p. 48.

Caranx djeddaba Cuvier & Valenciennes, l. c. p. 51.
Caranx vari Cantor, Journ. Asiat. Soc. XVIII. 1850, p. 1107.
Selar vari Bleeker, Verh. Bat. Gen. XXV. 1853, p. 44 (name only).
Caranx djeddaba Günther, Cat. Brit. Mus. II. 1860, p. 432.
Selar djeddaba Bleeker, Versl. Akad. Amsterdam XII. 1861, p. 75 (name only)[1].
Caranx djeddaba Klunzinger, Abh. zool. botan. Ges. Wien XXI. 1871, p. 458.
Caranx Djeddaba Day, Fish. India 4° 1878—1888, p. 218.
Caranx (Selar) djeddaba Klunzinger, Fische Roth. Meer. 1884, p. 97.
Caranx djeddaba Duncker, Mitth. Naturh. Mus. Hamburg XXI. 1904, p. 156.
Caranx djeddaba Evermann & Seale, Bull. Bur. Fisheries XXVI. (1906) 1907, p. 65.
Caranx djeddaba Jordan & Richardson, Bull. Bur. Fish. XXVII. (1907) 1908, p. 250.
Caranx djedaba Bean & Weed, Proc. U. S. Nat. Mus. XLII, 1912, p. 599 (s. syn.).
Caranx (Atule) djeddaba Wakiya, Ann. Carnegie Mus. XV. 1924, p. 199.
Caranx djeddaba Hora, Mem. Asiat. Soc. Bengal VI. 1924, p. 485.
Caranx djeddaba Fowler, Journ. Bomb. Nat. Hist. Soc. XXX. 1925, p. 316.
Caranx djeddaba Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 546.

D.^{1} (I procumbent) VIII; D.^{2} I 22—26; A. II. I 19—22; P. 21. Scutes about 58.

Oblong, dorsal and ventral profiles evenly and equally convex. Height more or less than 3; head 3.5 to 4 in length, its height nearly equal to its length. Eye about 4 in head, equal to snout and nearly to interorbital space; its posterior adipose eyelid well developed. Lower jaw slightly prominent; maxillary reaching to below first third of eye. Uniserial fine teeth in jaws, a patch or band on vomer, a narrow band on palatines and tongue. Scales on breast, cheeks and behind eye; lateral line in anterior portion strongly curved, reaching to below first to third dorsal ray, about twice shorter than straight portion, which has in maximo 58 scutes, the anterior and posterior shorter, the largest about 4 times higher than long. Dorsal spines moderate, the third slightly the longest, about $^1/_3$ of height of body; nearly equalling anterior dorsal rays. Pectorals falciform, shorter than head; ventrals reaching half way to anal. Caudal deeply forked, the lobes pointed. Gill-rakers 26—28 on lower part of first branchial arch. Colours bluish above, silvery below, a distinct black opercular spot; spinous dorsal gray, soft dorsal blackish edged. Length up to 350 mm.

Habitat: Penang; Singapore; Java (Batavia). — Red Sea, Zanzibar, Natal (Delagao Bay), Madagascar, Muscat, British India, Andamans, Siam, Tonkin, Riu Kiu Islands, Formosa, Philippines.

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[1] Bleeker did not known *C. djedaba* by autopsy from the Archipelago, he mentions it only on the authority of others from Penang and from British India.

7. **Caranx (Selar) kalla** C. V. [Fig. 44 p. 217].

Caranx kalla Cuvier & Valenciennes, Hist. nat. Poiss. IX. 1833, p. 49.
? *Caranx para* Cuvier & Valenciennes, l. c. p. 58.
Caranx cambon Cuvier & Valenciennes, l. c. p. 60.
Selar Kuhlii Bleeker, Nat. Tijdschr. Ned. Indië I. 1851, p. 360. — Verh. Batav. Gen. XXIV. 1852, Makreel. Visschen p. 54.
Selar brevis Bleeker, Nat. Tijdschr. Ned. Indië I. 1851, p. 361. — Verh. Batav. Gen. XXIV. 1852, Makreel. Visschen p. 54.
Selar para Bleeker, l. c. p. 56 (= Caranx cambon C. V. secundum Bleeker).
Selar kalla Bleeker. Verh. Batav. Gen. XXV. 1853, Bengalen p. 44 (name only).
? *Selar para* Bleeker. ibid. (name only).
? *Selar Broekmeyeri* Bleeker, Nat. Tijdschr. Ned. Indië IX. 1855, p. 398 (juv.).
Caranx calla Günther, Cat. Brit. Mus. II. 1860, p. 433.
Caranx brevis Günther, l. c. p. 435.
? *Selar micropus* Bleeker, Acta Soc. Indo-Neerl. VIII, 1860. Vischfauna Borneo, p. 39.
Caranx xanthurus Bleeker, Ned. Tijdschr. Dierk. II. 1865, p. 174 (= Selar kuhli Blkr. secundum Bleeker).
Caranx para Kner, Novara Reise, Fische 1865—67, p. 153.
Caranx xanthurus Kner, l. c. p. 154.
Caranx kalla Day, Fish. Malabar, 1865, p. 83. — Fish. India 4^0, 1878—88, p. 219.
Caranx brevis Bleeker, Versl. Akad. Amsterdam (2) IV. 1870, p. 252.
Caranx calla Bleeker, Ned. Tijdschr. Dierk. IV. 1873, p. 131.
Caranx Kuhli Bleeker, Arch. Neerl. Sc. Nat. XIII. 1878, p. 50 [1]).
Caranx Kalla Day, Fish. India 4^0 1878—88, p. 219.
Caranx (*Selar*) *kalla* Klunzinger, Fische Roth. Meer. 1884, p. 97.
Micropteryx queenslandiae De Vis, Proc. Linn. Soc. N. S. Wales IX. 1884, p. 541.
? *Alepes scitula* Fowler, Fishes Sumatra, 1904, p. 509. Journ. Acad. Nat. Sc. Philadelphia (2) XII, 1902—1904 (Subgen. *Rastrum*).
Caranx calla Evermann & Seale, Bull. Bureau fish. XXVI. 1906, p. 65.
Caranx brevis Evermann & Seale, ibid.
Caranx kalla Jordan & Seale, Proc. Davenp. Ac. Sci. X. (1905) 1907, p. 6.
Caranx nigripinnis Jordan & Seale, Bull. Bureau fish. XXVI. (1906) 1907, p. 14 (nec Day).
Caranx calla Jordan & Richardson, o.c. XXVII. (1907) 1908, p. 250.
Caranx brevis Seale, Philipp. Journ. Sc. V. 1910, p. 271.
Caranx kalla Bean & Weed, Proc. U. S. Nat. Mus. XLII, 1912, p. 599.
Caranx kalla M. Weber, Siboga-Exp. Fische 1913, p. 398.
Caranx kalla McCulloch, Biol. Results „Endeavour" III. 1915, p. 139.
Alepes kalla Ogilby, Mem. Queensl. Mus. III. 1915, p. 62.
Selar calla Jordan & Starks, Ann. Carnegie Mus. XI. 1917, p. 443.
Caranx kuhli E. K. Jordan, Proc. U. S. Nat. Mus. LXVI, 1925, p. 16.
Selar kalla Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 537.
Caranx kuhlii Fowler, Fish. Oceania. Mem. Bishop Mus. X. 1928, p. 145.

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[1]) It is worth mentioning, that in this list of new-guinean fishes from 1878, *Caranx kuhlii* = *Selar kuhlii* is mentioned as a proper species and that Bleeker had not yet recognised its identity with *C. kalla* C. V.

D.[1] (I procumbent and concealed) VIII, D.[2] I 23—24; A. II. I 18—20; P. 20—22; L.l. scutae 40—46 [1]).

Ovate, tapering posteriorly, the ventral profile much more convex than the dorsal and sharp-edged till anal, the height varying according to length between 2.5 to nearly 4 in length; the small convex head 3.5—5. Eye 3—4, its diameter greater than snout and than interorbital space; posterior adipose eyelid not reaching pupil, the anterior narrow. Maxillary reaching to below first third of eye; jaws subequal, the lower prominent in larger specimens. Praeopercular border entire. Gillrakers long and slender, 28—30 in the lower part of the anterior arch. Teeth small, conical, even; in the jaws in a single series, in the anterior part of the vomer in a triangular patch, in a band on the palatines and in the middle of the tongue. Conspicuous scales on body, forming a sheath to anterior part of second dorsal and anal, breast scaly, cheeks and temples scaly, the head otherwise naked. Anterior part of lateral line moderately curved, terminating below 4th—6th dorsal ray; its straight part about twice longer than curved part with about 40—46 armed scutes, the highest of which go 6—7 times in height of body. Spinous dorsal with the 3rd, 4th, and 5th spine the longest, more than twice in head and less than height of anterior dorsal rays which gradually decrease in size and are somewhat produced. Soft anal of similar construction, originating about below 4th dorsal ray.

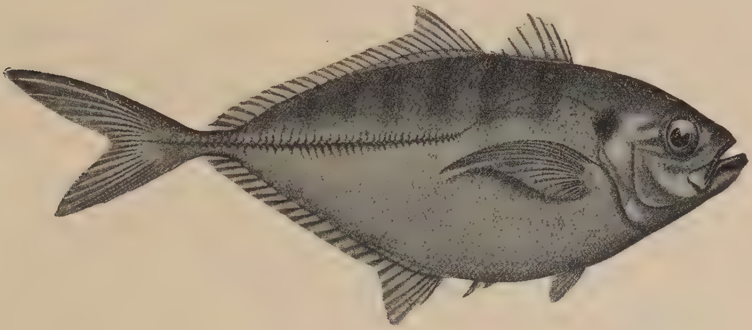

Fig. 44. *Caranx* (*Selar*) *kalla* C. V. After J. Douglas Ogilby.

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1) In australian specimens the number of rays is increased: in the dorsal to 25—26, in the anal to 21—22 (see Ogilby l. s. c. 1915).

Pectorals falciform, much longer than head. Ventrals small, rounded, implanted below base of pectorals, their second ray reaching vent. Caudal deeply forked, spreading, the upper lobe much the longest. Colour greenish gray above, silvery below, a conspicuous black spot on opercle and shoulder; tail and caudal in life (after Day) brilliant yellow, the upper lobe tinged green, other fins hyaline, anterior dorsal spines blackish. Length 200 mm. [Specimen of *C. para* in BLEEKER's collection in Museum of Amsterdam seen by us].

Habitat: Singapore; Penang; Banka; Bintang; Sumatra (Bagan Api Api!, Benkulen, Telokbetong, Priaman); Java (Batavia!, Japara, Prigi, Tandjong Priok!); Madura!; Bali; Borneo; Celebes (Makassar!, Bulucomba, Badjoa); Ambon; Halmaheira. — Red Sea, Delagoa Bay, Natal, Madagascar, Seychelles, South Arabia, British India, Ceylon, Andamans, Malay Peninsula, Siam, Amoy, China, Philippines, Queensland, Solomon Islands, Sandwich Islands.

Note. In the numerous publications of Bleeker, *Caranx kalla* C. V. is only mentioned in 1853 from Bengal and in 1872 from Amoy, both times on the authority of other investigators. As this species is known from the seas and coasts bordering the Archipelago to the west and the north and also from Australia and as it is after Bleeker's time also described from the Archipelago itself, it must be concealed in Bleeker's papers under an other specific name. As such must be considered *C. brevis* Blkr. or *C. kuhli* Blkr. or both. In our opinion *C. brevis* is described from young, *kuhli* from older specimens and both are identical with *kalla*. Probably both are also identical with *xanthurus* C. V. and Bleeker was right when he united it with his *Selar kuhlii* (Ned. Tijdschr. Dierk. II 1865, p. 174). One ought to remember, that the depth of body, the length of head, the length of pectorals vary greatly according to age and that, as f. i. McCulloch has shown, in two specimens of *Caranx kalla* of equal size the depth may be 2.4 and 2.8 in length. Bean & Weed are of opinion, that *Caranx* (*Selar*) *kuhli* Blkr. is synonymous with *C. djedaba* Forsk.; this seems to us to be impossible as, besides other differences, the straight posterior part of the lateral line has 40—46 scutes, while their number in *djedaba* is about 58.

8. Caranx (Selar) megalaspis Blkr.

Selar megalaspis Bleeker, Nat. Tijdschr. Ned. Indië V. 1853, p. 502 — o.c. XII. 1856, p. 214.

Caranx megalaspis Fowler, Journ. Acad. Nat. Sc. Philadelphia (2) XII. 1904, p. 510. — Proc. Acad. Nat. Sc. Philadelphia LVII. 1905, p. 72.

D.^{1} (I procumbent) VIII; D.^{2} I. 24—25; A. II. I. 20—22; P. 2. 17—19.

Oblong, compressed, height 2.6—2.75 in length; head about 3.7, bluntly pointed, dorsal and ventral profiles evenly convex. Eye 3—3.5 in head, with a posterior adipose eyelid, for the greatest part in anterior half of head; nearly equal to snout. Interorbital space smaller than eye, convex, with a median trenchant keel. Mouth oblique, chin prominent; maxillary reaching slightly behind frontborder of eye, distally expanded to half diameter of eye. Teeth minute, even, in a single series in jaws, in patches on vomer and palatines, tongue edentulous. Praeopercular border convex, entire. Gillrakers slender, a little longer than branchial filaments, 25 on lower part of first arch. Scales small; head naked, except a patch of scales on cheeks, opercles and upper posterior sides, breast scaly; anterior part of lateral line arched, reaching to below origin of soft dorsal, about $2^3/_4$ in straight portion which is composed of about 40 scutes, the posterior slightly armed, the broadest about $4^1/_6$ or less in depth of body. Spinous dorsal small, spines slender, the third the longest, $2^1/_2$ in head. Soft dorsal inserted much nearer tip of snout than to base of caudal; its anterior rays higher than spinous dorsal, the second $1^3/_4$ in head. Soft anal similar, inserted behind origin of soft dorsal, nearly in middle of length. Anterior portion of soft dorsal and anal with a low scaly sheath. Pectorals falcate, slightly longer than head; ventrals small, subequal to diameter of eye, inserted below base of pectorals. Caudal deeply forked, lobes pointed, the upper much longer. Colour greenish-gray above, silvery below; on upper part of opercle and shoulder a black blotch nearly equal to eye; fins yellowish or brownish. Length 137 mm. [Not seen by us].

Habitat: Sumatra (Padang, Priaman); Nias; in sea.

Doubtful species.

Caranx (Selar) microchir C. V.

Caranx microchir Cuvier & Valenciennes, Hist. nat. Poiss. IX. 1833, p. 59.

Selar microchir Bleeker, Act. Soc. Sc. Indo-neerl. VIII. 1860, Sumatra p. 30 (name only).

The description of Cuvier & Valenciennes is too incomplete and the fishes too young, only 40 mm. long, to make out, what species they are. According to the french authors, they are „assez voisin" de *C. para* C. V. They came from Strait Sunda.

2. Subgenus **Carangoides** Bleeker.

(Bleeker, Nat. Tijdschr. Ned. Ind. I. 1851, p. 352. — Makreel. Vissch. Verh. Batav. Gen. XXIV. 1852, p. 59).

Oblong or ovate, compressed. Adipose eyelids rudimentary. Breast scaly, or in different degree ventrally or also laterally naked. Anterior part of lateral line moderately curved, armed scutes present on posterior portion of straight part. Jaws, at least anteriorly, with a pluriseriate band of small teeth, by exception as in *ferdau*, *praeustus*, some of the anterior outer teeth are somewhat stronger (but in distinction to the subgenus *Caranx* s. str. the lower jaw is, at least anteriorly, provided with a villiform band not with an uniserial row of teeth). Anterior rays of soft dorsal and anal in adult more or less elevated, sometimes into a falcate lobe; none of the rays filamentous.

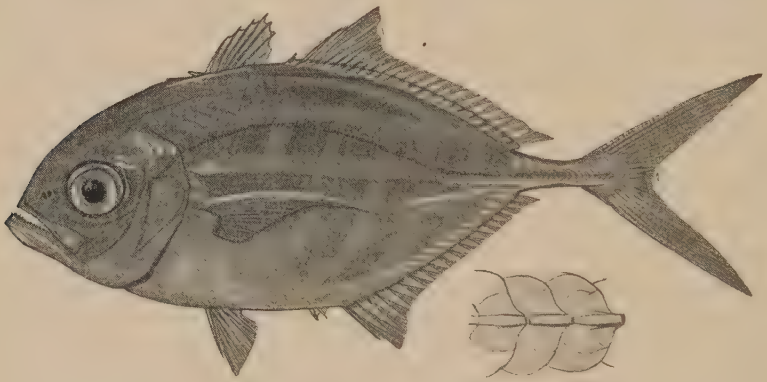

Fig. 45. *Caranx* (*Carangoides*) *plagiotaenia* Blkr. 4/5 nat. size. Lower figure: shields of lateral line magnified.

Key to the indo-australian species of the Subgenus Carangoides.

I. Dentition on jaws, vomer, palatines and tongue persistent.

A. Breast totally scaled, by exception its median line naked (scales lost?), anterior rays of soft dorsal and anal not elevated into a lobe, at most an indication of it in very old age.

  1. Scales conspicuous.

    a. D. VIII. I. 22—24; A. II. I. 19—20. Anterior part of lateral line slightly arched, twice longer than posterior part, which becomes straight below 20th dorsal ray; with 12—13 scutes. 1. *C. compressus* p. 223.

    b. D. VIII. I. 23—24; A. II. I. 19—20. Anterior part of lateral line moderately arched, longer than posterior part, which becomes straight below 7th to 9th dorsal ray; with 25—30 scutes. 2. *C. praeustus* p. 224.

    c. D. VII—VIII. I. 25—26. A. II. I. 22—23. Anterior part of lateral line flatly arched, $^{1}/_{4}$ longer than posterior part, which becomes straight below 13th dorsal ray; with 15—20 feeble scutes . . . . 3. *C. auroguttatus* p. 225.

  2. Scales minute, inconspicuous. D. VIII, I. 22—24, A. II, I. 19—20. Anterior part of lateral line $^{1}/_{3}$ longer than posterior part, which becomes straight below 14th to 15th dorsal ray, with 36—40 small, not armed scutes . . . . . . 4. *C. plagiotaenia* p. 226.

B. Breast ventrally and in a limited lateral area, but far distant from base of pectoral, naked. Anterior dorsal and anal rays elevated into a falciform lobe.

  a. D. VIII. I. 26—28; A. II. I. 22—24. Cleft of mouth commences below level of eye. Anterior part of lateral line with shallow arch, as long as posterior part, which becomes straight below posterior half of soft dorsal, with 15—20 distinct scutes below posterior rays. . . . . 5. *C. fulvoguttatus* p. 227.

  b. D. VII. I. 29—30; A. II. I. 24—26. Cleft of mouth commences opposite eye. Anterior part of lateral line forming a very flat arch or nearly a straight, somewhat undulating line, longer than posterior part, commencing about below middle of soft dorsal, with about 25 keeled scutes behind posterior third of dorsal . . . . 6. *C. ferdau* p. 228.

  c. D. VIII. I. 27—28; A. II. I. 23. Cleft of mouth commences opposite lower third of eye. Anterior part of lateral line forming a flat arch, becoming straight below second third of soft dorsal, with about 35 armed scutes, the broadest about 16 times in height of body. A brown band through eye to nape . . . . . 7. *C. ophthalmotaenia* p. 230.

C. Naked area of breast surpassing base of pectoral and of ventral.

1. Cleft of mouth commences opposite eye or its lower border.

a. D. VII—VIII. I. 30—31; A. II. I. 25—26. Anterior part of lateral line with a flat curve, somewhat longer than posterior part, which gradually becomes straight below second third of soft dorsal, with 23—25 scutes on its posterior half only. Anterior dorsal and anal rays not prolonged into a falciform lobe . . . . , . 8. *C. gymnostethoides* p. 231.

b. D. VIII. I. 20—21; A. II. I. 16—17. Anterior part of lateral line moderately arched, 1/4 longer than posterior part, becoming straight below about 13th dorsal ray, with 20 feebly armed scutes on its posterior portion. Anterior dorsal and anal rays forming a falcate lobe . . . . 9. *C. armatus* p. 233.

2. Cleft of mouth commences conspicuously below level of eye.

a. D. VIII. I. 21—22; A. II. I. 18—20. Anterior part of lateral line moderately arched, slightly shorter than posterior part, which becomes straight below 8th dorsal ray, with 36—40 armed scutes. Anterior dorsal and anal rays forming a falcate lobe . . . . . 10. *C. oblongus* p. 235.

b. D. VIII. I. 18—22; A. II. I. 16—19. Anterior part of lateral line moderately arched, much longer than posterior part, becoming straight below 13th—14th dorsal ray, with 23—26 feebly armed small scutes.

α. D. VIII. I. 21—22; A. II. I. 18—19. Eye 2.5—4 in head, its distance from end of snout much less than twice its diameter; gillrakers 25, rather short . . . . 11. *C. malabaricus* p. 237.

β. D. VIII. I. 18—20; A. II. I. 16—17.

Eye 4.5—5 in head, its distance from end of snout about twice its diameter; gillrakers 15—16, long, slender . . . . 12. *C. chrysophrys* p. 239.

II. The normal dentition of a *Carangoides* becomes with growth uniserial in jaws and inconspicuous on vomer, palatines and tongue and disappears totally in old age. D. VIII. I. 18, A. II, I. 17 (18). Breast ventrally and partly laterally naked. Anterior part of lateral line moderately arched, longer than posterior part which becomes straight below about 11th dorsal ray, with about 25 keeled scutes . . . . 13. *C. dinema* p. 241.

1. Caranx (Carangoides) compressus Day.

Caranx ferdau Rüppell, Atl. Fische Nördl. Afrika 1828, p. 99 (nec Forskål).

Caranx ferdau Cuvier & Valenciennes, Hist. nat. Poiss. IX. 1833, p. 56 (nec Forskål).

Caranx ferdau Günther, Cat. Brit. Mus. II. 1860, p. 439 (nec Forsk.).

Caranx compressus Day, Proc. Zool. Soc. London, 1870, p. 689.

Caranx brevicarinatus Klunzinger, Abh. zool. botan. Ges. Wien XXI. 1871, p. 461.

Caranx compressus Day, Fish. India 4⁰ 1878—1888, p. 221.

Caranx compressus Macleay, Proc. Linn. Soc. N. S. Wales VIII. 1883, p. 204. — o.c. IX. 1884, p. 24.

Caranx (*Carangoides*) *compressus* Klunzinger, Fische Roth. Meer. 1884, p. 98.

Caranx (*Carangoides*) *ferdau* Wakiya, Ann. Carnegie Mus. XV. 1924, p. 165 (nec Forskål).

$D.^1$ VIII. D^2 I. 22—24; A. II. I. 19—20.

Oblong, elongate, strongly compressed, back not, nape somewhat elevated; height 3.25—3.5 in total length, dorsal and ventral profile nearly equal. Head about 3.3 in total length, as long as high, rostro-frontal line ascending in a slightly convex line. Eye 3—3.5 in head, its diameter equal to or somewhat less than pointed snout. Maxillary extending to or somewhat beyond frontborder of eye. Mouth oblique, lower jaw strongly projecting. Teeth small, in very narrow bands in jaws, also on vomer, palatines and tongue. Breast scaly. Anterior part of lateral line slightly and evenly arched, about two times longer than straight part, which commences somewhat behind middle of soft dorsal, about below 20th dorsal ray (after Day below 12th ray, but his figure agrees better with the first statement) and has 12—13 small scutes forming a carina only on caudal peduncle. Third dorsal spine 3—4 in height of body, equal to or somewhat lower than acute anterior part of soft dorsal, the anterior rays of which are much more prominent ¹) than the following part of the fin; soft anal of similar structure but slightly lower. Both fins with a low scaly sheath. Pectorals falcate, ¹/₄ longer than head; ventrals about 2.5 in head; caudal forked. Colour bluish above, silvery below, with 5 more or less obsolete broad blackish crossbars; margin of opercle and praeopercle blackish; dorsal and caudal yellowish, anal hyaline. Length 400 mm. [Not seen by us].

Habitat: Red Sea, Andamans, Australia (Queensland, Lower Burdekin), Japan. In sea. We presume, that this distribution indicates its possible occurrence also in the Archipelago.

2. **Caranx (Carangoides) praeustus** Benn.

Caranx praeustus Bennett, Cat. Fish. Sumatra in Life of Raffles, 1830, p. 689.
Caranx ire Cuvier & Valenciennes, Hist. nat. Poiss. IX. 1833, p. 57.
Caranx ire Bleeker, Nat. & Geneesk. Arch. Ned. Indië (3) II. 1845, p. 517 (name only).
Carangoides praeustus Bleeker, Nat. Tijdschr. Ned. Indië I. 1851, p. 363. — o.c. II. 1851, p. 471. — Makreel. Vissch. Verh. Batav. Gen. XXIV. 1852, p. 60.
Selar ire Bleeker, Nalez. Bengalen & Hindostan, Verh. Batav. Gen. XXV. 1853, p. 44 (name only).
Carangoides praeustus Bleeker, l. c. p. 46 (name only).
Caranx ire Günther, Cat. Brit. Mus. II. 1860, p. 436.
Caranx praeustus Günther, ibid.
Caranx melanostethos Day, Proc. Zool. Soc. London 1865, p. 23. — Fish. Malabar 1865, p. 83.
Citula praeusta Bleeker, Versl. Akad. Amsterdam (2) II. 1868, p. 293 (name only).
Caranx praeustus Günther, Fische Südsee, 1876, p. 134.
Caranx ire Day, Fish. India 4⁰ 1878—88, p. 220.
Caranx ira Seale, Philippine Journ. Sci. V. 1910, p. 271.
Caranx ire Bean & Weed, Proc. U. S. Nat. Mus. XLII. 1912, p. 599.
Selar ire Jordan & Starks, Ann. Carnegie Mus. XI. 1917, p. 443.

D.¹ (I procumbent) VIII, D.² I. 23—24; A. II. I 19—20.

Oblong, compressed; dorsal profile a little more convex than ventral; height about 2.50 in length; head about 3.50, nearly as long as high; its rostro-frontal profile ascending in a nearly straight line, with a shallow concavity above eye. Eye 3 to 3.50, situated with its major part in anterior half of head, equal to or somewhat shorter than snout and equal to interorbital space. Lower jaw slightly longer, the upper

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1) In Day's figure they are more elevated, but this may be on account of the size of his specimen (Klunzinger).

terminating below frontborder or first third of eye; more than half its diameter equals highest part of praeorbital. Teeth in jaws in villiform bands, in the upper externally somewhat enlarged, in the lower posteriorly reduced to a single row; on the vomer anteriorly in a semilunar patch, with a median forward point, posteriorly in a median narrow band; equal bands on the palatines and in the middle of the tongue. About 23 gillrakers on lower part of anterior arch, longer than half diameter of eye. Conspicuous scales cover the body, also the totality of the breast [1]); on the head they are only wanting on the snout, praeorbital, jaws, occipital crest and opercular apparatus; lateral line moderately curved till below seventh to ninth dorsal ray, the straight part conspicuously shorter than the curved; the incipient shields small, opposite the thirteenth to fifteenth ray, the 25—30 shields becoming gradually broader, and diminishing again on caudal peduncle, the broadest equalling about $^1/_8$ to $^1/_9$ of height of body. Dorsal spines weak, the third the longest, less than $^1/_3$ of height of body and lower than anterior rays of soft dorsal, which go about twice in head and are somewhat longer than anterior rays of anal. Both soft fins with a high basal scaly sheath. Caudal lobes nearly equal. Pectorals falcate, equal to or somewhat shorter than head. Ventrals half length of head. Colour brownish above, silvery below, no opercular spot; fins in alcohol specimens yellowish, anterior portion of soft dorsal with a blackish patch. Length 200 mm. [Specimen of BLEEKER's collection in the Amsterdam Museum seen by us].

Nom. indig.: Selar malam (Malay. Batavia); Romengan (Batjan).

Habitat: Singapore; Riouw Arch.; Bangka; Billiton; Bintang; Sumatra (Padang); Java (Batavia!, Pasuruan); Borneo (Sandakan, Balikpapan!, Kota Baru!); Celebes (Makassar!, Badjoa); Batjan!. — British India, Ceylon, Philippines, Tonkin. In sea.

3. **Caranx (Carangoides) auroguttatus** C. V.

Caranx fulvoguttatus Rüppell, Atl. Fische Nördl. Afrika 1828, p. 100 (nec Forskål).
Caranx auroguttatus (Ehrb.) Cuvier & Valenciennes, Hist. nat. Poiss. IX. 1833, p. 71.
Caranx auroguttatus Rüppell, Samml. Senckenberg. Mus. 1852, p. 13.
Carangoides aureoguttatus Bleeker, Nat. Tijdschr. Ned. Ind. IV. 1853, p. 470. — o.c. VI. 1854, p. 175. — Versl. Akad. Amsterdam XII. 1861, p. 53.

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1) Our specimens are not naked, „just in front of ventral fins" as described by Day.

Caranx fulvoguttatus Günther, Cat. Brit. Mus. II. 1860, p. 439 (nec Forsk.).
Caranx fulvoguttatus Klunzinger, Abh. zool. bot. Ges. Wien XXI. 1871, p. 460 (nec Forskål).
Caranx (*Carangoides*) *auroguttatus* Klunzinger, Fische Roth. Meer. 1884, p. 98.
Caranx auroguttatus Boulenger, Proc. Zool. Soc. 1887, p. 660.

D.^{1} (I procumbent) VII–VIII; D.^{2} I 25–26; A. II–I 22–23; P. 20–21.

Oblong, elongate, compressed; dorsal profile elevated, convex, ventral profile much less so; height $3^1/_4$[1]) in total length. Head somewhat pointed, slightly longer than high, about 4—4.2 in head, situated in its middle, one third shorter than snout; praeorbital $1^1/_2$ in eye in adult; maxillary reaching below frontborder of eye, in adult not so far. Mandible scarcely prominent. Teeth equal, in villiform bands in jaws, anteriorly somewhat broader; small teeth on vomer, palatines and tongue. Breast scaly, sometimes anteriorly in the middle line naked (scales perhaps lost?). Anterior part of lateral line shallowly arched, about $^1/_4$ longer than posterior part, commencing below thirteenth dorsal ray; with about 15—20 feeble scutes, their armature becoming more conspicuous at a short distance before caudal peduncle. Third dorsal spine the longest, less than $3^1/_2$ times in height of body. Soft dorsal and anal not elevated in an anterior falcate lobe but the first rays slightly higher than third spine. Pectorals falcate, longer than head; ventrals more than twice shorter than head; caudal with acute lobes. Colour greyish-green above, silvery below, the sides with more or less numerous round golden or yellow spots; no opercular spot; spinous dorsal dusky or blackish, other fins greyish or yellowish. Length 350 mm. [Not seen by us].

Nom. indig. Kuweh tutul (Malay. Batavia); Bobara (Ternate).

Habitat: Singapore; Java; Ternate. — Red Sea, Muscat. In sea.

4. **Caranx (Carangoides) plagiotaenia** Blkr. [Fig. 45 p. 220].

Carangoides plagiotaenia Bleeker, Vischfauna, Ambon, Acta Soc. Sc. Indo-neerl. II. 1857, p. 59.
Çitula plagiotaenia Bleeker, Enum. Poiss. Amboine, Ned. Tijdschr. Dierk. II. 1865, p. 290.

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1) Height of body and length of head are in this species and in C. (C.) fulvoguttatus (Forsk.) measured in total length (the caudal included) to facilitate comparison with the few existing descriptions.

Caranx micraspis Kner, Sitzb. Akad. Wien, LVIII, 1868, pp. 28, 321.
Caranx plagiotaenia M. Weber, Jenaische Denkschr. VIII. 1895, p. 106.

D.^{1} (I procumbent) VIII, D.^{2} I 22—24; A. II, I 19—20.

Oblong, strongly compressed, dorsal and ventral profile nearly equally convex, height about 2.2 in length. Head 3.25 in length, higher than long, rostro-occipital profile strongly convex, a sharp occipital crest from height of nostrils to dorsal. Eye nearly 3 in head, situated for its major part in anterior half of head, longer than blunt snout; height of praeorbital less than half diameter of eye. Mouth small, oblique, lower jaw projecting, upper jaw slightly protractile, reaching to below anterior part of pupil. Teeth in jaws in villiform bands; minute teeth on vomer in a $\wedge$-patch, on palatines in a slender band, on tongue in a median longitudinal band. About 25 gillrakers on lower part of anterior arch, about as long as pupil. Scales minute, badly visible, present on breast, on cheeks, praeoperculum, superiorly on operculum and above eye, head otherwise naked; lateral line moderately curved, the curved portion $^1/_3$ longer than straigth portion, which commences below fourteenth or fifteenth dorsal ray, with 36—40 small shields with a sensory tube and conspicuous pore; the broadest on caudal peduncle and already beginning below last dorsal rays, they are not broader than about $^1/_4$ diameter of eye and not armed. Dorsal spines rather weak, much shorter than anterior dorsal rays, which go about thrice in heigth of body and are somewhat longer than anterior anal rays. Pectorals strongly falcate, longer than head, reaching about to fourth anal ray. Ventrals shorter than half head. Colour brownish above, silvery below, with 6 broad brownish, somewhat oblique subcutaneous crossbands, in larger specimens not visible in full reflecting light; no opercular spot, fins hyaline. Length 112 mm.

Habitat: Ambon!; Strait Sunda. — Formosa.

5. **Caranx (Carangoides) fulvoguttatus** (Forsk.).

Scomber fulvoguttatus Forskål, Descr. animal. 1775, p. 56.
? *Caranx gymnostethus* Cuvier & Valenciennes, Hist. nat. Poiss. IX. 1833, p. 73.
? *Caranx fulvoguttatus* Cuvier & Valenciennes, l. c. p. 75.
Carangoides fulvoguttatus Bleeker, Nat. Tijdschr. Ned. Indië, II. 1851, p. 178. — Makreel. Vissch. p. 89, Verh. Batav. Gen. XXIV. 1852, p. 89.
Caranx Bleekeri Klunzinger, Abh. zool. bot. Ges. Wien XXI. 1871, p. 461.
Caranx (Carangoides) fulvoguttatus Klunzinger, Fische Roth. Meer. 1884, p. 98.

Caranx bleekeri Picaglia, Atti Soc. Modena (3) XIII. 1894, p. 31.
Caranx bleekeri Bamber, Journ. Linn. Soc. Zool. XXXI. 1915, p. 480.

D.[1] (I procumbent) VIII, D.[2] I 26—28; A. II—I 22—24. Body in young elongate-ovate, in old more elongate, elliptical, height 3—4 in total length. Head about 4, obtuse convex, nearly as long as high, the vertex elevated, rostro-frontal line somewhat convex. Eye 4, in large specimens 5 in head, situated in its middle; its diameter 1.25—2 in length of snout; maxillary terminating before middle of eye in young, in old below its frontborder; jaws nearly equal. Praeorbital about equal to eye. Teeth small but conspicuous, in villiform bands in jaws, vomer, palatines and tongue, those of lower jaw narrow. Naked area of breast reaches upwards to about middle of distance between ventral line and base of pectoral and is continued to about middle of ventral. Anterior part of lateral line with a conspicuous but shallow arch, about of the same length as the posterior straight part, which commences below posterior half of soft dorsal, its 15—20 scutes are distinctly visible below posterior rays, only the posterior ones are feebly armed. Third dorsal spine the longest, more than thrice in height of body; soft dorsal with anterior elevated rays, somewhat falcate, more than twice in height of body; anal similar but lower. Both fins with a high scaly sheath. Pectorals falcate, longer than head; ventrals more than twice shorter than head; caudal with equal lobes. Colour bluish-grey above, silvery below, the sides with scattered golden or brass-coloured round spots; a blackish spot on opercle; fins yellowish or hyalin; the young sometimes with obsolet dark crossbars. Length 600 mm. [Not seen by us].

Nom. indig. Kuweh (Malay. Batavia).

Habitat: Java (Batavia). — Red Sea, Muscat, Madagascar, Seychelles. In sea.

6. **Caranx (Carangoides) ferdau** (Forsk.)

Scomber ferdau Forskål, Descript. animal. 1775, p. 55.
Scomber bajad varietas Forskål, ibid.
Caranx bajad Rüppell, Atl. Fische Nördl. Afrika 1828. p. 98.
Carangoides hemigymnostethus Bleeker, Nat. Tijdschr. Ned. Ind. I. 1851, p. 364. — Makreel. Vissch. Verh. Batav. Gen. XXIV. 1852, p. 61.
Caranx Bajad Rüppell, Samml. Senckenberg. Mus. 1852, p. 13.
Caranx bajad Günther, Cat. Brit. Mus. II. 1860, p. 438.
Citula hemigymnostethus Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 235.

Caranx bajad Playfair & Günther, Fishes of Zanzibar 1866, p. 60.
Caranx venator Playfair, Proc. Zool. Soc. London 1867, p. 859.
Caranx ferdau Klunzinger, Abh. zool. bot. Ges. Wien XXI. 1871, p. 462.
Citula bajad Bleeker, Poiss. de Madagascar etc. 1875, p. 99 (name only).
Caranx laticaudis Alleyne & Macleay, Proc. Linn. Soc. N. S. Wales I. 1875, p. 325.
Caranx ferdau Günther, Fische Südsee II. 1876, p. 134.
Caranx ferdau Day, Fish. India 4⁰ 1878—88, p. 217.
Caranx (Carangoides) ferdau Klunzinger, Fische Roth. Meer. 1884, p. 99.
Caranx ferdau Sauvage, Poiss. Madagascar, 1891, p. 330.
Carangoides ferdau Jenkins, Bull. U. S. Fish. Comm. XXII. (1902) 1904, p. 446.
Carangoides ferdau Jordan & Evermann, Bull. U. S. Fish. Comm. XXIII. (1903) 1905, p. 198.
Caranx gilberti Jordan & Seale, Bull. Bur. Fish. XXV. (1905) 1906, p. 234.
Caranx ferdau Kendall & Goldsborough, Mem. Mus. Comp. Zool. 1911, p. 269.
Caranx ferdan M. Weber, Siboga-Exp. 1913, p. 399 [1]).
Caranx ferdau McCulloch, Biol. Results „Endeavour" III. 1915, p. 125. — Checklist fish. N. S. Wales II. 1919, p. 52.
Carangoides jordani Nichols, Amer. Mus. Nov. 1922, N⁰. 50, p. 2.
Carangoides jordani D. St. Jordan & E. K. Jordan, Mem. Carnegie Mus. X. 1922—25, p. 40.
Caranx laticaudis McCulloch, Mem. Queensland Mus. VIII. 1924, p. 74.
Caranx (Citula) hemigymnostethus Wakiya, Ann. Carnegie Mus. XV. 1924, p. 182.
Caranx (Carangoides) ferdau E. K. Jordan, Proc. U. S. Nat. Mus. Wash. 66, 1925, p. 16.
Ferdauia jordani Jordan, Evermann & Tanaka, Proc. Calif. Acad. Sci. XVI. 1927, p. 662.
Carangoides ferdau Fowler, Fish. Oceania, Mem. Bishop Mus. X. 1928, p. 150.

D.[1] (I procumbent) VII, D.[2] I. 29—30; A. II. I. 24—26.

Oblong, compressed, dorsal profile from tip of snout to caudal peduncle evenly convex, ventral profile less so till anal, whence it curves to caudal peduncle; height 2.4—2.7 in length. Head 3.4—3.6, as high as long, the nape trenchant, usually a shallow depression on front. Eye 3.5—4.5 in head, its major part before middle of head and above longitudinal axis of body; its diameter shorter than snout and as convex interorbital space. Maxillary reaching frontborder of pupil; mouth sligthly oblique, jaws equal. Praeorbital posteriorly half diameter of eye. Bands of small villiform teeth on jaws, vomer, palatines and tongue, the outer in jaws somewhat larger and unequal. Naked area of breast reaches to about upper third of the distance between ventral profile and base of pectoral and extends with a point nearly to ventral. Anterior part of lateral line runs in a very flat arch or in a nearly straight,

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1) *Caranx ferdan* misprint for *ferdau*.

slightly undulating line to below middle of soft dorsal, whence it is continued, without sharp distinction, as posterior straight part, which carries about 25 keeled scutes, commencing below posterior third of soft dorsal. Spinous dorsal weak and very low; soft dorsal with even rays, slightly lower than eye, but the 6 or 7 anterior rays forming an elevated falcate lobe, the longest anterior ray sometimes produced into a kind of filament, longer than half height of body. Soft anal of similar construction but the anterior lobe lower. Pectorals falcate with strongly narrowed tip, longer than head; ventrals more than twice in head. Caudal forked with somewhat rounded lobes. Colour greyish above, silvery below, an opercular dark spot present, a few yellow spots, differently dispersed, on sides; fins yellowish, lobe and margin of soft dorsal and margin of caudal blackish; pectorals and ventrals hyaline. Length up to 500 mm.

Habitat: Java (Batavia); Ternate; Salibabu Island!. — Red Sea, Madagascar, Seychelles, Muscat, British India, Japan, N. S. Wales, Lord Howe Island, Norfolk Island, Bonin Islands, Bonham-, Samoa-, Hawaiian-, Society- and Paumotu Islands.

Note: Wakiya (Ann. Carnegie Mus. XV. 1924, p. 166) describes in sequence of *Caranx* (*Carangoides*) *ferdau* (Forsk.): *Caranx* (*Carangoides*) *equula* Temminck & Schlegel known only from Japan and recently also described by Barnard from Agulhas Bank and Natal coast in 30 and 40 fathoms (Ann. S. Afric. Mus. XXI. 1925—27 p. 540). Wakiya adds that it is also reported by Bleeker to occur at Batavia. This seems to us to be erroneous. As far as we can see Bleeker quotes this species twice: as *Carangoides equula* Bleeker (Nieuwe nalezingen ichth. Japan p. 102, Verh. Batav. Gen. XXVI. 1854—57) from Japan and as *Citula equula* Blkr. (= *Caranx equula* Schl. and *Carangoides equula* Schl.) from Kiusiu (Verh. Akad. Amsterdam XVIII (1877) 1878, p. 14). In his "Enumeratio Piscium" 1859, it is not named from the Archipelago.

7. **Caranx (Carangoides) ophthalmotaenia** Blkr.

Carangoides ophthalmotaenia Bleeker, Makreel. Vissch. Verh. Batav. Gen. XXIV. 1852, p. 90. — Nat. Tijdschr. Ned. Indië III. 1852, p. 270.
Citula ophthalmotaenia Bleeker, Versl. Akad. Amsterdam XVI. 1864, p. 360.
Caranx ophthalmotaenia Evermann & Seale, Bull. Bur. Fish. XXVI. 1906, p. 64.

D.[1] (I procumbent) VIII, D.[2] I 27—28; A. II, I 23.

Oblong, compressed, dorsal profile elevated, much more convex than the ventral; height $2^1/_2$ to $2^3/_5$ in total length; head slightly higher than long, occiput obliquely elevated, about 4 in total length, its rostro-frontal profile declivous in a nearly straight line. Eye situated in the middle of the head, 3 to $3^1/_2$ in length of head, more than half its diameter remote from frontal profile, height of praeorbital at angle of mouth twice lower than diameter of eye. Snout not or almost not longer than eye; upper jaw shorter than lower, strongly protractile, terminating below anterior border of eye. Teeth in jaws conspicuous. Cheeks, top of operculum and lateral thoracal triangle scaly above, inferiorly and on inferior (ventral) triangle naked. Lateral line till below second third of soft dorsal curved (the arch broadly open); posteriorly with about 35 armed scutes, the broadest about 16 times in height of body. Fins acute, the spinous dorsal about $3^1/_2$ in height of body; soft dorsal with the first ray produced to a length slightly less than height of body; anal twice or about twice lower, the spines subequal; pectorals falcate, almost or not shorter than head; ventrals about twice shorter than head; caudal with equal lobes, $4^1/_3$ to $4^1/_2$ in total length. Colour greenish above, silvery below; an oculo-dorsal brown band; fins yellow. Length up to 126 mm. [After BLEEKER as we only dispose of a juvenile specimen of 40 mm length].

Habitat: Celebes (Menado); Saleyer!; Ambon; Saparua.

Note: Evermann & Seale (l. s. c.) have the species, after 4 specimens of 3 to 4.5 inches from Philippine Islands, described as follows: "Dorsal VIII, 27; anal II—I, 23; depth 2; head 3.05; anterior dorsal and anal rays elongate; a brown band from base of mandible upward and backward through eye to nuchal region; ventrals dusky". Our juvenile specimen has also the ventrals blackish and the commencement of gape of mouth opposite lower third of eye.

8. **Caranx (Carangoides) gymnostethoides** Blkr.

Carangoides gymnostethoides Bleeker, Nat. Tijdschr. Ned. Indië I. 1851, p. 364. — Makreel. Vissch. Verh. Batav. Gen. XXIV. 1852, p. 61.

Caranx gymnostethoides Günther, Cat. Brit. Mus. II. 1860, p. 431.

Caranx gymnostethoides Kner, Fische Novara-Exp. 1865—67, p. 153.

Caranx gymnostethoides Day, Fish. India 4⁰, 1878—88, p. 217.

Carangoides gymnostethoides Jordan & Evermann, Bull. U. S. Fish. Comm. XXIII. (1903) 1905, p. 199.
Caranx gymnostethoides Jordan & Seale, Bull. Bur. Fish. XXV. (1905), 1906, p. 232.
Caranx gymnostethoides Pellegrin, Bull. Soc. Zool. XXXIX. 1914, p. 228.
Carangoides gymnostethoides evermanni Nichols, Amer. Mus. Novit. 1921, N⁰. 3, p. 2. — l. c. 1922, N⁰. 50, p. 3 (fide Fowler).
Caranx gymnostethoides McCulloch, Rec. Austral. Mus. XV. 1926, p. 31.
Ferdauia evermanni Jordan, Evermann & Tanaka, Proc. Calif. Acad. Sci. (4) XVI. 1927, p. 662.
Carangoides gymnostethoides Fowler, Fish. Oceania, Mem. Bishop Mus. X. 1928, p. 150.

D.^{1} (I procumbent) VII—VIII, D.^{2} I 30—31; A. II—I 25—26.

Elliptical, compressed, height about 3,4 in total length, dorsal profile convex, ventral less so, being almost straight to anal. Head more than 3.4 in total length, longer than high, rostronuchal line strongly arched in adult. Eye 4.2 to more than 5 in head, 1.5 to nearly 2 in blunt snout; a narrow posterior adipose eyelid; height of praeorbital equal to or shorter than eye; maxillary reaching to about frontborder of eye or to that of pupil, according to length. Mouth slightly oblique, situated rather low down; lower jaw little or not prominent. Teeth in villiform bands on jaws, vomer, palatines and in middle of tongue. Fine scales on cheeks and temporal region, head otherwise naked; the naked triangular area on breast extending with a narrow stripe to about middle of adpressed ventral fin and dorsally somewhat surpassing base of pectoral. Anterior part of lateral line flatly curved above base of pectoral, gradually becoming straight below second third of soft dorsal, somewhat longer than straight part, which has 23–25 scutes developed only in its posterior half, rather small with low keels, stronger on caudal peduncle. Spinous dorsal rather weak, the third and fourth spine the longest, about thrice in height of body, lower than soft dorsal and anal, the anterior rays of which go about 2$^1/_2$ in that height; last dorsal and anal ray finlet-like prolonged; both fins anteriorly with a well-developed basal scaly sheath. Caudal lobes moderate, equal. Pectorals falcate, about 2.5 in total length, their slender tips reaching to posterior half of anal; ventrals twice or somewhat more shorter than head. Colour greenish above, dull silvery below, a brown opercular indistinct spot, wanting in young; second dorsal with a dark margin, sometimes also anal. Length 700 mm. [Specimen of BLEEKER's collection in the Amsterdam Museum seen by us].

Nom. indig. Kuweh lilin (Malay. Batavia).

Habitat: Java (Batavia). — British India, Madagascar, Queensland (Great Barrier Reef), Hawaiian Islands, Johnston Island, Society Islands. In sea.

9. **Caranx (Carangoides) armatus** (Forsk.).

Sciaena armata Forskål, Descript. animal. 1775, p. 53.
Citula plumbea Quoy & Gaimard, Voy. Uranie, Zool. 1824, p. 361.
Citula ciliaria Rüppell, Atl. Fische Nördl. Afrika 1828, p. 102.
Citula armata Rüppell, l. c. p. 103.
Caranx citula Cuvier & Valenciennes, Hist. nat. Poiss. IX. 1833, p. 126.
Caranx armatus Cuvier & Valenciennes, l. c. p. 127.
Caranx ciliaris Cuvier & Valenciennes, l. c. p. 129 (juv.).
Olistus malabaricus Cuvier & Valenciennes, l. c. p. 137.
Olistus? *Ruppelii* Cuvier & Valenciennes, l. c. p. 144.
Caranx armatus Bleeker, Nat. & Geneesk. Arch. N. I. (3) II 1845, p. 517.
Caranx ciliaris Bleeker, ibid.
Caranx armatus Cantor, Cat. Malay. Fish. Asiat. Soc. Bengal 1850, p. 1113.
Carangoides citula Bleeker, Makreel. Vissch. Verh. Batav. Gen. XXIV. 1852, p. 65.
Caranx seriolinus Montrouzier, Ann. Sc. phys. Soc. d'Agric. Lyon (2) VIII. 1856, p. 452.
Citula seriolinus Thiollière, Fauna Woodlark, 1857. p. 174.
Carangoides armatus Bleeker, Nat. Tijdschr. Ned. Ind. XVIII. 1859, p. 354.
Caranx armatus Günther, Cat. Brit. Mus. II. 1860, p. 453.
Carangoides ciliaris Bleeker, Versl. Akad. Amsterdam XIV. 1862, p. 109.
Citula ciliaris Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 235.
Caranx armatus Playfair & Günther, Fish. Zanzibar 1866, p. 61.
Caranx citula Kner, Novara-Exped. Fische 1865—67, p. 156.
Caranx armatus Klunzinger, Abh. zool. bot. Ges. Wien XXI. 1871, p. 455.
Citula armata Bleeker, Ned. Tijdschr. Dierk. IV. (1871) 1872, p. 131. — Arch. Néerl. Sc. Nat. XIII. 1878, p. 50.
Caranx armatus Macleay, Descr. Cat. Austral. Fish. I. 1881, p. 171.
Caranx (*Carangoides*) *armatus* Klunzinger, Fische Roth. Meer. 1884, p. 99.
Caranx armatus Day, Fish. India 4^0, 1878—88, p. 223.
Caranx auratus M. Weber, Semon Reise, Jenaische Denkschr. VIII, 1895, p. 106 [1]).
Citula armata Fowler, Proc. Acad. Nat. Sc. Philadelphia LVII, 1905, p. 83.
Caranx plumbeus Jordan & Seale, Bull. Bureau Fish. XXV. (1905) 1906, p. 233.
Caranx armatus Evermann & Seale, o.c. XXVI. 1906, p. 65 [2]).
Caranx rastrosus Jordan & Snyder, Mem. Carnegie Mus. IV. 1911, p. 37.

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1) Misprint for *C. armatus* (Forsk.)

2) *Citula armatus* (Forsk.) of Seale, Philippine Journ. Sci. V. N^0. 4, 1910, p. 272, characterized „by the peculiar shape, the elongate ventral, dorsal and anal; the ventrals extend beyond caudal; the spinous dorsal represented by six minute spines, colour with indistinct dusky bands; a more distinct band extends through the eye", is an immature *Alectis*, probably *A. indica* (Rüpp.). He calls it „a common food-fish of Borneo", which is rather extraordinary.

Caranx armatus Bean & Weed, Proc. U. S. Nat. Mus. XLII. 1912, p. 600.
Caranx armatus M. Weber, Siboga-Exp. Fische 1913, p. 394.
Citula armata Jordan & Starks, Ann. Carnegie Mus. XI. 1917, p. 443.
Caranx (Citula) armata Wakiya, l. c. XV. 1924, p. 169.
Caranx (Citula) schlegeli Wakiya, l. c. p. 170.
Caranx (Citula) plumbeus Wakiya, l. c. p. 171.
Caranx (Citula) ciliaris Wakiya, l. c. p. 172 (for *Citula ciliaria* Rüpp.).
Caranx armatus Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 542.
Carangoides armatus Fowler, Fish. Oceania, Mem. Bishop Mus. X. 1928, p. 151.

D.^{1} (I procumbent) VIII, D.^{2} I 20—21; A. II—I 16—17.

Ovate, strongly compressed, the nape elevated, curving down to point of snout in a convex, trenchant line, height somewhat more or less than twice in length. Head higher than long, about 3—3.5 in length. Eye in adult 3.5 in head, about equal to blunt snout and convex interorbital space, situated nearly in middle of head and crossed by longitudinal axis of body; in young the eye more than four in head and longer than snout. Maxillary reaching to frontborder of pupil or to middle of eye; adipose eyelids feebly developed; praeorbital much lower than eye. Teeth minute in narrow villiform bands on jaws, vomer, palatines and tongue. Gillrakers about 21 on lower part of anterior arch. Triangular naked patch of breast extending somewhat behind base of ventrals. Lateral line moderately arched; becoming straight below about middle or posterior third of soft dorsal or below about thirteenth ray; the arched part in adult $^1/_4$ longer than straight part, on the posterior section of which are only to be counted more or less than 20 feebly armed, small scutes. Anterior rays of dorsal and anal forming an elevated falcate lobe, the height of which increases with age and may attain in the dorsal fin half of the total length of the body, in the anal less so; both fins with a high scaly basal sheath in adult. Pectorals much longer than head; ventrals less than half length of pectorals. Caudal deeply forked, with equal lobes and with a conspicuous superior and inferior oblique basal crest on both sides. Colour bluish-green above, silvery below, opercular spot moderately distinct, less so in young; spinous dorsal and ventrals usually blackish; soft dorsal, anal and caudal yellowish, their produced rays black; pectorals yellowish with black axil; the young with 4—6 dark crossbars. Length up to 500 mm. 1)).

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1) The eggs and larvae are described by Delsman (Treubia VIII. 1926, p. 216).

Habitat: Penang; Singapore; Sumatra (Benkulen, Trussan, Padang, Tiku, Priaman); Nias!; Banka; Java (Batavia, Semarang!, Japara); Bawean; Bali; Lombok!; Sumbawa; Timor; Celebes (Makassar, Bonthain, Bulucomba, Badjoa, Menado, Tombariri); Siau!; Ternate; Batjan; Obi; Ceram; Ambon!; New Guinea. — Red Sea, Aden, Zanzibar, Delagoa Bay, Madagascar, Seychelles, South Arabia, Orissa, British India, Ceylon, Bangkok, Tonkin, China, Formosa, Japan, Philippines, Australia (Endeavour Bay, Somerset, Cape York, West Australia), Woodlark, New Britain, Ile de France, Samoa.

10. **Caranx (Carangoides) oblongus** C. V. [Fig. 46 p. 236].

Caranx oblongus Cuvier & Valenciennes, Hist. nat. Poiss. IX. 1833, p. 128.
Caranx oblongus Bleeker, Nat. & Geneesk. Arch. Ned. Ind. (3) II. 1845, p. 517 (name only).
Caranx oblongus Cantor, Cat. Malay. Fish. Journ. Asiat. Soc. Bengal 1850, p. 1114.
Carangoides oblongus Bleeker, Makreel. Vissch. Verh. Batav. Gen. XXIV. 1852, p. 62.
Caranx oblongus Günther, Cat. Brit. Mus. II. 1860, p. 452.
Caranx oblongus Day, Proc. Zool. Soc. London 1870, p. 689.
Caranx oblongus Peters, Monatsb. Akad. Berlin 1876, p. 836.
Caranx oblongus Day, Fish. India 4°, 1878—88, p. 222.
Caranx auriga De Vis, Proc. Linn. Soc. N. S. Wales IX. 1884, p. 539 (fide Ogilby).
Carangoides oblongus Fowler, Journ. Acad. Nat. Sci. Philadelphia (2) XII. 1904, p. 513.
Carangoides oblongus Fowler, Proc. Acad. N. Sci. Philadelphia LVII. 1905, p. 83.
Caranx oblongus Jordan & Seale, Bull. Bur. Fish. XXV. (1905) 1906, p. 232.
Caranx oblongus (?) Bean & Weed, Proc. U. S. Nat. Mus. XLII. 1912, p. 600.
Citula gracilis Ogilby, Mem. Queensl. Mus. III. 1915, p. 75 (fide McCulloch).
Citula oblonga Ogilby, l. c. p. 134.
Caranx (*Citula*) *oblongus* Wakiya, Ann. Carnegie Mus. XV. 1924, p. 175.
Caranx oblongus McCulloch, Rec. Austral. Mus. XV. 1926, p. 31.
Carangoides oblongus Fowler, Fish. Oceania, Mem. Bishop Mus. X. 1928, p. 151.

D.^{1} (I procumbent) VIII, D.^{2} I, 21—22; A. II, I 18—20.

Oblong, compressed, dorsal profile convex from snout to caudal peduncle, ventral profile slightly oblique from chin to anal, thence ascending to caudal peduncle, which is rather robust, quadrangular and slightly less than diameter of eye at its root; height about 2.6 in length. Head 3.5—3.6 in length, slightly higher than long, its occiput elevated, the rostro-occipital profile ascending in a slightly convex trenchant line. Eye 3.5—4 in head, situated, somewhat obliquely, for its major part in anterior half of head, approximate to frontal profile; in adult a little shorter than blunt snout and interorbital space; the adipose eyelid forming a narrow rim; broadest above antero-superior angle; praeorbital posteriorly much lower than diameter of eye[1]). Mouth slightly oblique, jaws about equal, the upper strongly protractile, maxillary with broad truncated hindborder reaching below anterior part of eye. Nineteen gillrakers on lower part of first arch, finely tuberculated, the longest about the size of pupil, decreasing ventrally till about one fifth that length. Teeth in jaws in villiform bands, broadest anteriorly, some of the outer irregularly enlarged, conical but no canines; small teeth in a patch on vomer, in a band on palatines and tongue. Scales small, wanting on base of pectorals and on breast, the triangular naked area reaching behind ventrals. Cheeks, temporal region, upper part of operculum scaly, head and a median area reaching to dorsal spine, otherwise naked. Anterior part of lateral line moderately arched, becoming straight below about eighth dorsal ray; the straight portion slightly longer than the curved, with 36 to 40 armed scutes, gradually increasing in size, broadest below posterior dorsal rays and equalling $^1/_9$ or $^1/_{10}$ of height of body. Dorsal spines in a groove, slender, about $3^1/_2$ times in height of body. The seven anterior dorsal rays forming a falciform lobe, the second produced into a filament, reaching to caudal or on its upper lobe. The six anterior anal rays forming a falciform lobe, much lower than height of body. Caudal broadly forked, the upper lobe the longest. Pectorals rounded, falciform, much

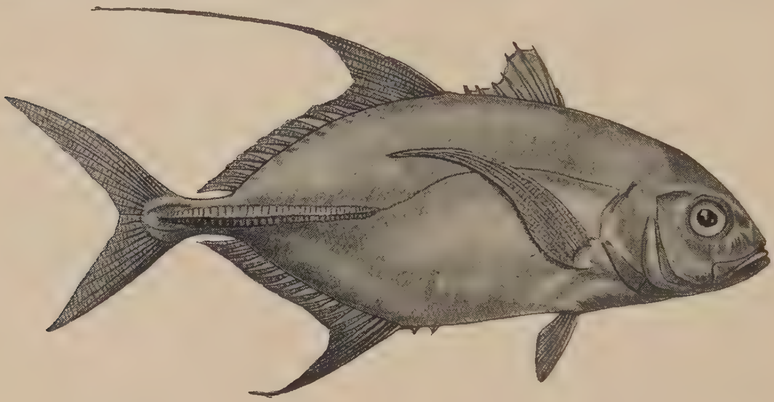

Fig. 46. *Caranx* (*Carangoides*) *oblongus* C. V. $^1/_3$ nat. size.

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[1]) The praeopercular serration of the juvenile state is long time preserved.

longer than head; ventrals originating behind pectorals, about twice shorter than head. Colour brownish-grey above, silvery below, no opercular spot; dorsal with an obscure margin, as also the caudal lobes, fins otherwise hyaline. Length 340 mm. [Specimen of BLEEKER's collection in the Amsterdam Museum seen by us].

Nom. indig. Kuweh (Malay. Batavia).

Habitat: Sea of Penang; Singapore; Sumatra (Padang); Java (Batavia); Aru Islands!. — British India, Andamans, Riu Kiu Islands, Formosa, Darnley Islands, Great Palm Island, New Britain, Bougainville Islands, Solomon Islands, Vanicolo, Oualan.

11. **Caranx (Carangoides) malabaricus** (Bl. Schn.) [Fig. 47 p. 238].

Scomber malabaricus Bloch, Schneider, Syst. ichth. 1801, p. 31.
Caranx caeruleopinnatus Rüppell, Atl. Fische Nördl. Afrika 1828, p. 100 (nec C. V).
Caranx malabaricus Cuvier & Valenciennes, Hist. nat. Poiss. IX. 1833, p. 121.
Caranx caeruleopinnatus Rüppell, Neue Wirbelthiere 1835. p. 47 (nec C.V.).
Caranx malabaricus Bleeker, Nat. & Geneesk. Arch. N. Ind. II. 1845, p. 517.
Caranx malabaricus Cantor, Catal. Malay. Fish. Journ. Asiat. Soc. Bengal XVIII. 1850, p. 1110.
Carangoides talamparah Bleeker, Makreel. Vissch. Verh. Batav. Gen. XXIV. 1852, p. 64.
Carangoides talamparoides Bleeker, l. c. p. 91.
Carangoides malabaricus Bleeker, Nat. Tijdschr. Ned. Ind. XVI. 1858—59, p. 407.
Caranx malabaricus Günther, Cat. Brit. Mus. II. 1860, p. 436.
Caranx talamparoides Günther, l. c. p. 437.
Citula malabarica Bleeker, Ned. Tijdschr. Dierk. II. 1865, p. 174.
Caranx malabaricus Playfair & Günther, Fish. Zanzibar 1866, p. 60.
Caranx malabaricus Kner, Novara-Exped. Fische 1865—67, p. 155.
Caranx malabaricus Klunzinger, Abh. zool. bot. Ges. Wien XXI. 1871, p. 463.
Citula coeruleopinnata Bleeker, Enumér. d. Poiss. de Madagascar etc. 1875, p. 99 (name only).
? *Caranx malabaricus* Day, Fish. India 4^0, 1878—88, p. 221, 789.
Caranx malabaricus Macleay, Descr. Cat. Austral. Fish. 1881, I. p. 167.
Caranx (Carangoides) malabaricus Klunzinger, Fische Roth. Meer. 1884, p. 99.
? *Caranx impudicus* Klunzinger, ibid.
Carangus malabaricus Jordan & Evermann, Proc. U. S. Nat. Mus. XXV, 1902, p. 337.
Carangoides gibber Fowler, Journ. Acad. Nat. Sc. Philadelphia (2), XII, 1904, p. 512.
Carangoides malabaricus Fowler, Proc. Acad. Nat. Sc. Philadelphia LVII. 1905, p. 83.
Caranx malabaricus Bean & Weed, Proc. U. S. Nat. Mus. XLII. 1912, p. 600.
Caranx malabaricus M. Weber, Siboga-Exp. Fische 1913, p. 394.
Caranx malabaricus McCulloch, Biol. Results „Endeavour" III. 1915, p. 136.
Caranx malabaricus Fowler & Bean, Proc. U. S. Nat. Mus. LXII. 1922, p. 20.
Caranx (Citula) malabaricus Wakiya, Ann. Carnegie Mus. XV. 1924, p. 178.

Caranx (Citula) caeruleopinnatus Wakiya, l. c. p. 179.
Caranx malabaricus Vinciguerra, Ann. Mus. Civ. Genova L., 1926, p. 562.
Caranx malabaricus Barnard, Ann. S. Afric. Mus. 1925—27, p. 541.

D.[1] (I procumbent) VIII, D.[2] I, 21—22; A. II—I, 18—19.

Oblong, height more or less than twice in length; the trenchant nape being elevated, the dorsal profile is strongly convex from tip of snout to caudal peduncle, with a slight concavity before nostrils, ventral profile less convex from chin to anal. Head short, much higher than long, 3 or more in length, the blunt snout 2.5 or more in head, slightly longer than eye, which is situated above axis of body in the middle of length of head, goes 2.5—4 times in its length and is somewhat shorter than convex interorbital space. Cleft of mouth commences below level of eye. Adipose eyelids feebly developed. Maxillary somewhat surpassing frontborder of eye; lower jaw prominent; praeorbital a little lower than eye. Breast broadly naked, the naked area forming a triangle between hindborder of head, base of pectoral and from there in a straight line to ventral or somewhat behind it. Lateral line moderately arched, becoming straight behind middle of soft dorsal, about below fourteenth ray; straight portion twice shorter than the anterior one, in its posterior four fifths with about 25 weakly armed, small scutes. Teeth in villiform bands on jaws, vomer, palatines and tongue. Gillrakers more or less

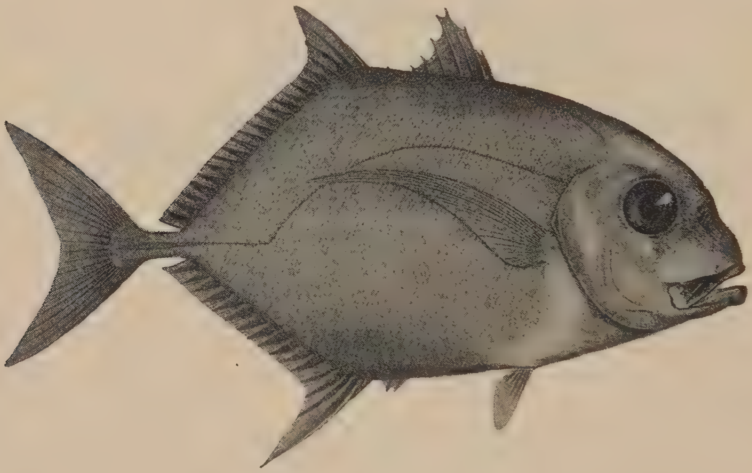

Fig. 47. *Caranx (Carangoides) malabaricus* (Bl. Schn.) After Rüppell.

than 25 on lower part of anterior arch. Second and third dorsal spines the longest, nearly twice shorter than anterior elevated dorsal rays, forming a lobe about $^1/_4$ shorter than head; the soft dorsal otherwise rounded, parallel to contour of body; the soft anal of similar form, its lobe somewhat shorter. Pectorals broadly falcate, longer than head; ventrals small, rounded; caudal with widely spreading acute lobes of equal length. Colour dusky above, silvery below, the black opercular spot in a dark surrounding; soft dorsal, anal and caudal with a dark margin, otherwise fins light. Length up to 365 mm.

Habitat: Penang; Singapore; Sumatra (Padang, Priaman); Java (Batavia!, Tandjong Priok!, Japara); Postillon Islands!; Borneo (Serawak); Celebes (Makassar); Solor!; Lomblem Island!; Batjan; Ambon; Ceram!; New Guinea. — Red Sea, Muscat, Delagoa Bay, Natal coast, Bourbon, Seychelles, British India, Ceylon, Malay Peninsula, Bangkok, China (Canton, Swatow), Japan, Formosa, Australia (Queensland).

Note: According to Klunzinger (Fische Roth. Meer. 1884, p. 99) *C. malabaricus* Day (Fish. India 4° 1878—88, p. 221) is not this species but an other one, described by Klunzinger as *Caranx* (*Carangoides*) *impudicus* on account of the fact, that the naked area of the breast extends to the anal and that the straight part of the lateral line commences before the middle of the anal. Day quotes, in that case wrongly, as synonyma and distribution, those that belong to *C. malabaricus*. But one of us (M. Weber, Siboga-Exp. Fische 1913, p. 395) has doubted the correctness of the opinion of Klunzinger, and tried to show, that *C. impudicus* Klunz. is not to be distinguished from *C. malabaricus* Day.

12. **Caranx (Carangoides) chrysophrys** C. V.

Caranx chrysophrys Cuvier & Valenciennes, Hist. Nat. Poiss. IX. 1833, p. 77.
Carangoides chrysophryoides Bleeker, Nat. Tijdschr. Ned. Ind. I. 1851, p. 366. — Makreel. Vissch. Verh. Batav. Gen. XXIV. 1852, p. 63.
Caranx chrysophryoides Günther, Cat. Brit. Mus. II. 1860, p. 452.
Caranx chrysophrys Kner, Novara-Exp. Fische 1865—67, p. 155.
Caranx nigrescens Day, Proc. Zool. Soc. London 1867, p. 704.
Citula chrysophrys Bleeker, Ned. Tijdschr. Dierk. IV. (1871) 1872, p. 132.
Caranx nigrescens Day, Fish. India 4^0, 1878—88, p. 223.
Caranx chrysophryoides Perugia, Ann. Mus. Civ. Genova (2) VII. 1889, p. 274.

Caranx chrysophrys Sauvage, Poiss. Madagascar 1891, p. 328 [1]).
Carangus armatus Jordan & Evermann, Proc. U. S. Nat. Mus. XXV. 1902, p. 338 (nec Forskål, fide Wakiya).
Citula chrysophrys Ogilby, Mem. Queensl. Mus. III. 1915, p. 77.
Caranx chrysophrys McCulloch, Biol. Results „Endeavour" III. 1915, p. 136.
Caranx (*Citula*) *chrysophrys* Wakiya, Ann. Carnegie Mus. XV. 1924, p. 180.
Caranx chrysophrys Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 540.

D.^{1} (I procumbent) VIII; D.^{2} I, 18—20; A. II, I 16—17.

Compressed, oval, dorsal profile regularly convex, ventral profile less so, somewhat declivous till anal; height 2—2.04 in length; head elevated 3—3.08 in length, about as long as high. Eye 4.5 to more than 5 in head, situated above longitudinal axis of body, about twice its diameter distant from end of blunt snout, its diameter is less than trenchant interorbital space; the cleft of mouth commences below level ot eye; it is slightly oblique. Adipose eyelid more or less rudimentary. Lower jaw slightly longer, maxilla reaches somewhat behind frontborder of eye. Minute teeth in jaws in rather broad bands, in a triangular patch on vomer, in a longitudinal band on palatines, none on tongue (after Sauvage also on tongue). Cheeks, temporal region and upper part of opercles scaled, breast naked as in *malabaricus*. Anterior part of lateral line curved parallel to dorsal profile, becoming straight below 13th dorsal ray; the curved portion much longer than the straight portion, which has 23 to 26 feebly developed keeled scutes, only the most posterior are more conspicuously armed. On the lower part of the anterior arch are 15 to 16 long and slender gillrakers. Spinous dorsal small; the five or six anterior dorsal rays elevated into a falcate lobe, about half height of body; anal of similar form, caudal deeply forked, with equal lobes. Pectorals falcate, much longer than head, ventrals about as long as snout. Colour dusky-greyish above, silvery below, fins dusky, blackish in young. A diffused opercular spot. Length 315 mm.

Habitat: Java (Batavia); Nias!. — Natal coast, Madagascar, Mozambique, Seychelles, Muscat, British India, China, Formosa, Queensland.

Note: According to Klunzinger (Fische Roth. Meer. 1884, p. 99) *C. chrysophrys* C. V. belongs to *C. malabaricus* (Bl. Schn.). Both species are certainly quite near. They can be distinguished that *chrysophrys* has a smaller eye, 4.5—5 in head, which is about twice its diameter distant from end of snout, a slightly different fin formule, a less elevated nape. In *malabaricus* the eye goes 2.5—4 times in head, its distance from end of snout is much less than twice its diameter.

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[1]) His figure (Pl. 31, fig. 4) shows erroneously the breast totally scaled in opposition to his statement in the text.

13. **Caranx (Carangoides) dinema** Blkr.

Carangoides dinema Bleeker, Nat. Tijdschr. Ned. Indië I. 1851, p. 365.— Makreel. Vissch. Verh. Batav. Gen. XXIV. 1852, p. 63.
? *Leioglossus carangoides* Bleeker, Nat. Tijdschr. Ned. Ind. I. 1851, p. 367. — Makreel. Vissch. Verh. Batav. Gen. XXIV. 1852, p. 70.
? *Caranx lioglossus* Günther, Cat. Brit. Mus. II. 1860, p. 432.
Caranx dinema Günther, l. c. p. 452.
Caranx lioglossus Kner, Fische Novara-Exp. 1865—67, p. 156.
Caranx lioglossus Boulenger, Proc. Zool. Soc. London, 1892, p. 135.
Caranx (*Citula*) *dinema* Wakiya, Ann. Carnegie Mus. XV. 1924, p. 178.
Caranx carangoides Fowler, Fish. Oceania, Mem. Bishop Mus. X. 1928, p. 146.

D.[1] (I procumbent) VIII, D.[2] I, 18 (21); A. II—I 17 (18).

Oblong, compressed, dorsal profile much more convex than the ventral, nape elevated, height thrice in total length, about 2.3 in that of body. Head about 4.5 in total length, 3.8 in that of body, higher than long, rostro-occipital profile declivous in a somewhat straight line. Eye 3.5 to about 4 in head, for the major part situated in its anterior half, its diameter shorter than or nearly equal to snout; maxillary reaching to below middle of eye; lower jaw slightly prominent; praeorbital much lower than eye. Teeth in jaws in young in pluriseriate narrow, anteriorly even in villiform bands; vomer, palatines and tongue toothed; later they become uniserial in jaws and inconspicuous on vomer, palatines and tongue, discernible only by touch; in very old specimens (700 mm.) they are totally absent. Cheeks and opercles scaly above; breast inferiorly and partly on its sides naked. Lateral line moderately arched till below third fifth of soft dorsal (about eleventh ray), whence the shorter straight part shows about 25 keeled scutes. Longest dorsal spines about 3.5 in height of body; first ray of dorsal and anal produced into a filament, which reaches base of caudal or nearly so. Pectorals falcate, longer than head; ventrals less than twice in head. Colour: greenish above, lighter below; caudal with a dark margin, axil and distal part of ventrals blackish. Length 725 mm. [Specimen of BLEEKER's collection in Amsterdam Museum seen by us].

Nom. indig.: Kuweh (Malay. Batavia).

Habitat: Singapore; Nias!; Sumatra (Padang, Siboga); Java (Batavia); Banka; Waigeu. — Muscat, Ceylon, Riu Kiu Islands.

3. Subgenus **Caranx** s. str. Bleeker.

(*Caranx* Bleeker, Nat. Tijdschr. Ned. Indië I. 1851 p. 352. — Makreel. Visschen, Verh. Bat. Gen. XXIV. 1852, p. 56).

Oblong, compressed, occipital region elevated, trenchant. Lower jaw prominent; the upper reaching to below or behind centre of eye: eye with adipose eyelid. Breast totally scaly or ventrally naked with exception of a small central patch of minute scales; anterior part of lateral line moderately or strongly arched, posterior straight part with armed scutes along its whole length. Dentition not changing with age; the teeth in the upper jaw in a villiform band, with an outer series of stronger ones; in the lower jaw in a single series of middle-sized teeth, the 2 or 4 anterior mostly stronger, caniniform; vomer, palatines and tongue toothed. Anterior rays of soft dorsal and anal forming a falcate lobe; none of them produced into a filament. No finlets.

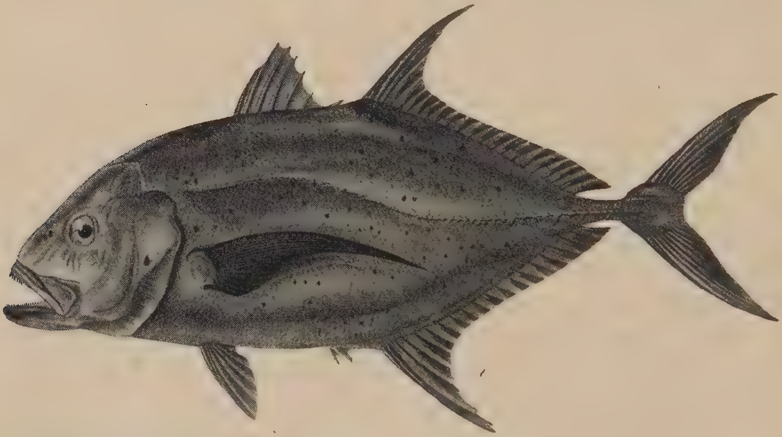

Fig. 48. *Caranx* (*Caranx*) *stellatus* Eyd & Soul. After Eydoux & Souleyet.

Key to the indo-australian species of subgenus Caranx

A. Breast entirely scaly.

1. D. VII—VIII, I 19—22; A. II, I 15—17. Anterior part of lateral line moderately arched,

about $^1/_3$ shorter than straight part, which commences below fourth to sixth dorsal ray and has 30—33 keeled scutes. Colour without spots. 1. *C. sexfasciatus* p. 243.

2. D. VIII, I 23—25; A. II, I 19—20. Anterior part of lateral line moderately arched, somewhat shorter than straight part, which commences below third dorsal ray and has 36—38 scutes. Colour without spots. . . . . 2. *C. melampygus* p. 248.

3. Doubtful species, probably identical with melampygus. . . . . 3. *C. cynodon* p. 252.

4. D. VII, I 24; A. II, I 18—20. Anterior part of lateral line running nearly straight till below fourth dorsal spine, thence curving downward till below eighth to tenth dorsal ray, where the posterior part begins, with 30—35 scutes. With irregular dark spots, increasing in number and size with age. . . . . 4. *C. stellatus* p. 253.

B. Breast laterally more or less naked, ventrally naked with a small median patch of minute scales before ventrals.

1. D. VIII, I 22—23; A. II, I 18. Anterior part of lateral line with a low, somewhat undulating arch, shorter than straight part, which commences below 5th to 7th dorsal ray and has 36 scutes. Cleft of mouth commences opposite lower edge of eye. . . . . 5. *C. sansun* p. 254.

2. VIII, I 19—20; A. II, I 16—17. Anterior part of lateral line moderately arched, somewhat shorter than straight part, which commences below sixth dorsal ray and has 28—30 scutes. Cleft of mouth commences below level of eye. 6. *C. ignobilis* p. 255.

3. VIII, I 20—22; A. II, I 16—18. Anterior part of lateral line moderately arched, much shorter than straight part, which commences below fifth or sixth dorsal ray, with 33 to 37 keeled scutes. Cleft of mouth commences opposite lower third of eye. . . . . 7. *C. carangus* p. 257.

Doubtful species. . . . . 8. *C. janthinospilos* p. 259.

1. **Caranx (Caranx) sexfasciatus** Q. G.

Caranx sexfasciatus Quoy & Gaimard, Voy. de l'Uranie, 1824, p. 358 (juv.).
? *Scomber Heberi* Bennett, Fish. Ceylon 1828—30, p. 26.
Caranx Forsteri Cuvier & Valenciennes, Hist. nat. Poiss. IX. 1833, p. 107.
? *Caranx Peroni* Cuvier & Valenciennes, l. c. p. 112 (juv.).
Caranx Belengeri Cuvier & Valenciennes, l. c. p. 116.
? *Caranx Heberi* Cuvier & Valenciennes, l. c. p. 119.
Caranx forsteri Richardson, Ann. Mag. Nat. Hist. XI. 1843, p. 28.
? *Scomber Hippos* L. Forster, Descr. animal. edid. Lichtenstein 1844, p. 199 (nec. L.).

? *Caranx paraspistes* Richardson, Voy. Erebus & Terror, 1844, p. 136.
Caranx flavocoeruleus Temminck & Schlegel, Fauna Japon. 1845, p. 110.
Caranx sexfasciatus Bleeker, Nat. & Geneesk. Arch. Ned. Indië II (3) 1845, p. 517.
Caranx Forsteri Bleeker, Journ. Ind. Arch. III. (1848) 1849, p. 67. — Nat. Tijdschr. Ned. Ind. II. 1851, p. 213. — o.c. III. 1852, p. 164. — Makreel. Vissch. Verh. Batav. Gen. XXIV. 1852, p. 57.
Caranx Forsteri Cantor, Cat. Malay. Fish. Journ. Asiat. Soc. Bengal 1850, p. 1109.
Caranx hippos Günther, Cat. Brit. Mus. II 1860, p. 449 (nec L.).
Caranx Forsteri Kner, Novara-Exp. Fische, 1865—67, p. 158.
Carangus hippos Bleeker, Versl. Akad. Amsterdam (2) II. (1867) 1868, p. 282.
Caranx Lessonii Bleeker, ibid. [1]).
Caranx hippos Klunzinger, Abh. zool. bot. Ges. Wien 1871, p. 465.
Caranx hippos Günther, Fische Südsee II. 1876, p. 131 (p. p.).
? *Caranx papuensis* Alleyne & Macleay, Proc. Linn. Soc. N.S. Wales, I, 1876, p. 325.
Caranx hippos Day, Fish. India 4°, 1878—88, p. 216 (nec L.).
Caranx hippos Macleay, Descr. Cat. Austral. Fish. I. 1881, p. 170.
Caranx hippus Klunzinger, Fische Roth. Meer. I. 1884, p. 100.
Caranx hippos Sauvage, Poissons Madagascar 1891, p. 325.
Caranx sexfasciatus Sauvage, l. c. p. 327.
Caranx forsteri Sauvage, l.c. p. 329.
Caranx latus Fowler, Proc. Acad. Nat. Sc. Philadelphia 1900, p. 501 (nec Agassiz) fide Fowler.
Caranx sexfasciatus Seale, Occas. Papers B. P. Bishop Mus. I. 1901, p. 74.
Caranx sexfasciatus Jordan & Evermann, Proc. U. S. Nat. Mus. XXV. 1902, p. 337.
Carangus marginatus Jenkins, Bull. U.S. Fish. Comm. XXII. (1902) 1904, p. 444 [2]).
Carangus rhabdotus Jenkins, ibidem.
Carangus latus Jenkins, ibid.
Carangus latus Snyder, loc. cit. p. 523.
Caranx semisomnus Fowler, Journ. Acad. Nat. Sc. Philadelphia (2) XII. 1904, p. 510.
Carangus elacate Jordan & Evermann, Bull. U.S. Fish. Comm. XXIII (1903) 1905, p. 190.
Carangus marginatus Jordan & Evermann, l. c. p. 191.

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1) Bleeker never gave a description of what he called *Caranx Lessonii* C.V. But he says in his paper „Troisième notice sur la faune ichthyologique de la Nouvelle-Guinée" Versl. Akad. Amsterdam (2) II 1868, p. 282: „Dans ma dernière notice sur cette faune ce nombre fut porté déjà à 263, mais de deux espèces j'ai fait autrefois double emploi et du *Carangus hippos* qui figure comme deux espèces sous le nom de *Caranx forsteri* C. V. et de *Caranx Lessonii* C. V." After him both are therefore synonyma of *Carangus hippos* Blkr., which we have placed under *C. sexfasciatus* Q. G.

2) It is perhaps worth while to remark for those authors, who are inclined to maintain *Caranx marginatus* Gill. (Proc. Acad. Nat. Sc. Philadelphia 1866) as a proper species, different from *C. sexfasciatus* Q. G., that Bleeker (Verh. Holl. Maatsch. Wetensch. Haarlem XVIII. 1863, p. 81) used the name *marginatus* for a species of *Caranx* from Ashantee, which he called *Hemicaranx marginatus*.

Carangus rhabdotus Jordan & Evermann, loc. cit. p. 193.
? *Caranx sem* Fowler, Journ. Acad. Nat. Sc. Philadelphia (2) XII, 1904, p. 512. — Proc. Acad. Nat. Sc. Philadelphia LVII, 1905, p. 79 [1]).
Caranx marginatus Fowler, Proc. Acad. Nat. Sc. Philadelphia, 1905, p. 81 (fide Fowler).
Caranx sexfasciatus Jordan & Seale, Bull. Bureau fish. XXV. (1905) 1906, p. 231.
Caranx sexfasciatus Evermann and Seale, o. cit. XXVI. 1906, p. 65.
? *Caranx forsteri* Steindachner, Sitzb. Akad. Wien CXV. 1906, p. 1403.
Caranx sexfasciatus Seale, Philippine Journ. Sci. V. 1910, p. 270.
Caranx forsteri Bean & Weed, Proc. U. S. Nat. Mus. XLII. 1912, p. 598.
Caranx forsteri M. Weber, Siboga-Exp. Fische 1913, p. 395.
Tricropterus forsteri Jordan & Starks, Ann. Carnegie Mus. XI, 1917, p. 442.
? *Caranx papuensis* McCulloch, Mem. Queensland Mus. VIII. 1924, p. 69.
Caranx sexfasciatus Wakiya, Ann. Carnegie Mus. XV. 1924, p. 184.
Caranx marginatus D. St. Jordan & E. K. Jordan, Mem. Carnegie Mus. X. 1922—25, p. 39.
Caranx marginatus E. K. Jordan, Proc. U. S. Nat. Mus. LXVI. 1925, p. 15.
Caranx forsteri Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 543.
Caranx sexfasciatus Fowler, Fish. Oceania, Mem. Bishop Mus. X. 1928, p. 149 (s. syn).

D.^{1} (I procumbent) VII—VIII, D.^{2} I, 19—22; A. II, I 15—17; P. 19—21.

Oblong, compressed, dorsal profile strongly arched, ventral slightly convex, height 2.50 to 2.75 in length, 3—3.75 in length with caudal. Head obtusely convex, 3 to 3.3 in length, 4—4.50 in length with caudal, rostro-frontal line rounded. Eye 3—4 in head, its diameter longer than interorbital space and, according to age, shorter than or equal to snout, which is rather pointed; praeorbital bone posteriorly more or less than twice lower than diameter of eye; upper jaw terminating in adult below posterior half of eye; lower jaw prominent. Breast entirely scaly. Anterior part of lateral line moderately arched, becoming straight below fourth to sixth dorsal ray; curved part about $^1/_3$ shorter than straight part, which has 30—33 scutes, the largest of which equal to about one seventh of height of body. Teeth in upper jaw in a narrow band, with an outer series of enlarged ones, in lower jaw in a single series; vomer

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1) We do not understand how it is possible to make out, what was meant by Cuvier, when he published this very unsatisfactory diagnosis of *C. sem*. He calls it (Cuvier & Valenciennes, Hist. nat. Poiss. IX, 1833, p. 105) „une espèce qui ressemble, à s'y méprendre, à la fausse carangue d'Amérique''. One of the characters of this *C. fallax* is „sa poitrine écailleuse (p. 96), but Cuvier does not mention this cardinal point about *C. sem*, and *Sauvage* (Poiss. Madagascar p. 325) calls the breast of *C. sem* naked.

palatines and tongue toothed. Dorsal spines lower than anterior lobe of soft dorsal and anal, which are lower than length of head. Pectorals falcate, in young about equal, later much longer than head; ventrals twice or more shorter than head. Caudal deeply forked, the lobes acute. Colour in young bluish, later brownish above, lighter below; in young till about 80 to 100 mm. length crossed by 5—7 broad dark bands, disappearing lateron, the first crossing the eye; in young the spinous dorsal and the lobe of the soft dorsal blackish, all other fins yellowish, in adult the dorsal, anal and caudal more or less blackish, the paired fins light; a small black spot above gillopening. Length till about 1000 m̃m.

Nom. indig. Kuweh (Malay. Batavia); Selar, when older Tarkulu (Bandjermasin).

Habitat: Penang; Singapore; Banka; Sumatra (Tiku, Benkulen, Padang, Priaman); Sabang!; Nias!; Java (Batavia!, Tandjong Priok!, Karangbollong); Cocos Islands; Bali; Lombok!; Sumbawa!; Flores!; Timor!; Aru Islands!; Borneo (Singkawang, Pamangkat, Sandakan, Balikpapan!, Kota Baru!); Celebes (Makassar!, Bulucomba, Badjoa, Menado, Tombariri); Saleyer!; Buton!; Siau!; Sangir Islands; Halmaheira; Ternate; Batjan; Obi major; Buru; Ambon!; Ceram!; Waigeu!; New Guinea; Goram Arch. — Red Sea, Aden, Muscat, Zanzibar, Beira!, Delagoa Bay, Natal, Madagascar, Mayotte, Bourbon, British India, Ceylon, Andamans, Nicobars, Tonkin, China, Formosa, Japan, Australia, Marianes, New Hebrides, Fidji-, Gilbert-, Ellice-, Marshall-, Samoa-, Hawaiian Islands.

In sea and brackish water, entering rivers.

Note. The systematic estimation of the present and some related species depends on the principal question whether *Caranx hippos* Linné (Syst. nat. ed. XII. 1766, p. 494), originally described from South Carolina, and also known from the Antilles and the east coast of tropical America till Cape Cod, likewise occurs in the indo-pacific region or is restricted to the Atlantic. Its occurrence in both regions was for the first time expressely advocated by Günther in his Catalogue (1860) and again in his „Südseefische"; an opinion which was followed f.i. by Klunzinger (Fische Roth. Meer. 1884, p. 100), Sauvage (Poissons Madagascar 1891, p. 325) and also by Jordan & Evermann (North American Fish. 1896,

p. 920). Bleeker mentions *Caranx hippos* L., under the generic name „*Carangus*", from the Archipelago for the first time in 1868. He says in an article about fishes from New Guinea (Versl. Akad. Amsterdam (2) II. 1868) that *Caranx forsteri* C. V. and *C. Lessonii* C. V., both mentioned by him in 1859 from New Guinea, ought to be united as *Carangus hippos* (L.): manifestly under the influence of Günther's opinion; for from that date appears *C. hippos* L. in his later lists of fishes, while *C. forsteri* C. V. in his numerous earlier papers continually quoted from different parts of the Archipelago, disappears from his writings. Günther (Catalogue 1860) mentioned as indo-pacific synonyma of *C. hippos* L.: *C. sem* C. V., *C. forsteri* C. V. (Cantor, Catalogue 1850, Bleeker, Makreel. Vissch. Verh. Batav. Gen. XXIV. 1852, p. 57 and Nat. Tijdschr. Ned. Indië III. 1852, p. 164); *C. sexfasciatus* Q. G.. ? *C. Peronii* C. V., *C. Lessonii* C. V., *C. belengerii* C.V., *C. flavo-coeruleus* Schl., *C. paraspistes* Richards. (Erebus & Terror, 1844, p. 136). In his „Südseefische 1876" this interpretation is changed in so far as *C. sem* and *lessonii* are distinguished by a query, while *C. marginatus* Gill (1862) and *C. caninus* Gthr. are added as further synonyma. Günther's doubt about the appurtenance of *C. sem* C. V. and *C. lessonii* C. V. to *C. hippos* L., indicated by the query, harmonizes with the statement of Sauvage (1891), reached by his examination of the types in the Paris Museum, that *C. sem* and *C. lessonii* can not belong to *C. hippos* L., as both, (a fact not mentioned by Cuvier) „par leur thorax dépourvu d'écailles, rentrent dans le groupe de *Caranx carangus*". Otherwise Sauvage is also of opinion, that *C. hippos* „se retrouve à la fois dans la mer des Antilles et dans la mer des Indes"[1]).

This opinion is abandoned in recent years. Barnard (Ann. S. Afric. Mus. XXI. 1925—27, p. 544) f. i., while describing

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[1]) It is to be regretted, that the book of Sauvage, about the fishes of Madagascar (1891), seems to be neglected by the majority of modern authors, though he had the opportunity to study the types of Cuvier & Valenciennes. Otherwise it is not to be understood that f. i. Wakiya in his recent work about Japanese Carangidae (1924) describes the breast of *C. lessoni* C. V. and also that of *sem* C. V., a species which he compared with *xanthopygus* C. V. as „entirely scaly", while Sauvage, after studying the types, calls them „dépourvu d'écailles", and comes to the conclusion, that *Caranx lessoni* is the young state of *Caranx carangus* Bloch.

C. forsteri C. V. says: „it is quite certain, however, that this form is distinct from the true *hippos* L. of the Atlantic". He manifestly considers this species to be restricted to the Atlantic. This is also the opinion of the recent „Check List of fishes of N. & Middle America 1930", wherein Jordan & Evermann, contrary to their former opinion, interpret *C. hippos* L. as an exclusively atlantic species „apparently represented in the Pacific by the closely related *C. ignobilis*".

If we accept the statement, that *C. hippos* L. is an exclusively atlantic species, the question arises under what name are to be placed the fishes repeatedly described as *C. hippos* by numerous authors from different parts of the indo-pacific region and especially from the indo-australian Archipelago.

Restricting our attention to that Archipelago, *Caranx forsteri* C. V. (1833) is in the first place to take into consideration. But as already Bleeker, in 1852, stated, that *C. sexfasciatus* Q. G. (1824) is the juvenile state of *C. forsteri* C. V. (1833), an opinion accepted also by later authors, the name *C. sexfasciatus* Q. G. has the precedence.

2. **Caranx (Caranx) melampygus** C. V.

Caranx melampygus Cuvier & Valenciennes, Hist. nat. Poiss. IX. 1833, p. 116.
Caranx bixanthopterus Rüppell, Neue Wirbelth. Fische 1835, p. 49.
Caranx melampygus Bleeker, Nat. Tijdschr. Ned. Indië VI. 1854, p. 58.
Caranx melampygus Günther, Cat. Brit. Mus. II. 1860, p. 446.
Carangus melampygus Bleeker, Ned. Tijdschr. Dierk. II. 1865, p. 148.
Caranx melampygus Playfair & Günther, Fish. Zanzibar 1866, p. 61.
Caranx bixanthopterus Klunzinger, Abh. zool. bot. Ges. Wien XXI. 1871, p. 464 (a mixture with *C. stellatus* Eyd. & Soul.).
Caranx melampygus Günther, Fische Südsee II. 1876, p. 133 (a mixture with *C. stellatus* Eyd. & Soul.).
Caranx melampygus Day, Fish. India 4° 1878—88, p. 214, in Suppl. p. 789 (a mixture with *C. stellatus* Eyd. & Soul.).
Caranx moresbyensis Macleay, Proc. Linn. Soc. N. S. Wales VII. 1882, p. 358 (fide McCulloch).
Caranx (Caranx) melampygus Klunzinger, Fische Roth. Meer. 1884, p. 99 (a mixture with *C. bixanthopterus* Rüpp. & *C. stellatus* Eyd. & Soul.).
Caranx latus Jenkins, Bull. U. S. Fish. Comm. XXII. (1902) 1904, p. 444 (nec Agassiz).
Caranx latus Snyder, l. c. p. 523 (nec Agassiz).
Carangus forsteri Jordan & Evermann, o.c. (1903) 1905 p. 191 (nec C. V.).
Caranx forsteri Jordan & Seale, Bull. Bureau fish. XXV (1905) 1906, p. 230.
Caranx melampygus Seale, Occas. Papers B. P. Bishop Mus. 1906, p. 32.
Caranx melampygus M. Weber, Nova Guinea, Zoologie V. 1908, p. 249.
? *Caranx melampygus* Kendall & Goldsborough, Mem. Mus. Comp. Zool. Harvard College, XXIV. 1911, p. 268.

Caranx melampygus M. Weber, Siboga-Exp. Fische 1913, p. 397.
Caranx melampygus McCulloch, Mem. Queensland Mus. VIII. 1924, p. 70 (s. syn).
Caranx bixanthopterus Wakiya, Ann. Carnegie Mus. XV. 1924, p. 190.
Caranx melampygus Wakiya, l. c. p. 192.
Caranx melampygus E. K. Jordan, Proc. U. S. Nat. Mus. Wash. LXVI. 1925, p. 15.
Caranx melampygus Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 544 (partly mixed with *C. stellatus* Eyd. & Soul.).
Caranx ascensionis Fowler, Fish. Oceania, Mem. Bishop Mus. X. 1928, p. 145 (p.p.).
Xurel melampygus Jordan, Evermann & Clark, Check List Fish. North- & Middle America, Washington 1930, p. 272.

D.[1] (I procumbent) VIII, D.[2] I, 23–25; A. II, I 19–20; P. 19.

Oblong, compressed, dorsal profile strongly convex, ventral nearly straight. Height 2.5—2.7; head 3.3 in length of body, slightly higher than long or equal to its height, the rostrofrontal line descending nearly straight to bluntly pointed snout. Eye 4 to 5.5 in head, about equal to or $^1/_3$ shorter than interorbital space, much shorter than snout, the maxillary reaching to below anterior half of eye or anterior edge of pupil; praeorbital bone posteriorly in young about twice shorter than diameter of eye, in old about equal to it. Teeth in upper jaw in a villiform band with an outer row of conical enlarged ones, a single series in lower jaw; vomer, palatines and tongue toothed. Breast entirely scaly. Lateral line moderately arched, becoming straight below anterior fifth of soft dorsal or its third ray; curved part somewhat shorter than straight part, which has 36—38 scutes, the most anterior much smaller, the posterior 8 to 9 in height of body. Spinous dorsal much lower than soft dorsal and anal, which are emarginate, the anterior produced lobe acute and about twice lower than body. Pectorals falcate, longer than head, nearly reaching to middle of anal; caudal with acute lobes. Colour bluish-green or brown above, lighter below; vertical fins pale at base, their tips black, the anal specially so; paired fins light, the pectorals bright yellow in life. Some of the young show evidences of broad dark cross-bars. Length 300 mm.

Habitat: Sabang!; Nias!; Java (Batavia)!; Bali; Flores!; Timor!; Celebes (Makassar!, Menado!, Tanawanko); Salibabu!; Karakelang!; Batjan; Halmaheira; Ambon!; Buru; Waigeu; New Guinea (Port Moresby, North New Guinea!). — Red Sea, Zanzibar, Natal, Madagascar, Mauritius, Seychelles, British India, Andamans, Japan, Samoa, Marcus Island, Tonga Island, Hawaiian Islands. In sea.

Note: A difficulty in discriminating *C. melampygus* C. V. is to solve the question what was meant by different authors by using that specific name. It is easy to state, that f. i. Jordan & Evermann (Bull. U. S. Fish. Comm. XXIII (1903) 1905, p. 191) described as *C. forsteri* C.V. what really is *C. melampygus* C. V. This is also the case with *C. forsteri* Jordan & Seale (Bull. Bureau Fish. XXV. (1905) 1906, p. 230). More difficult is the question of the relation of *melampygus* to *bixanthopterus* Rüpp. Rüppell had already presumed the possibility, that both are identical and added therefore *melampygus* C.V. with a query as a synonym to his *bixanthopterus*. Günther (Fische Südsee 1876, p. 133) united both under the name *melampygus* C. V. He added also *C. stellatus* Eydoux & Souleyet as a synonym, unfortunately to future disadventage of taxonomy. In fact these three species agree in the fin formula, in the number of scutes, in the entirely scaled breast and in the dentition, but *stellatus* differs at once by the small, dark, irregular spots on the body, increasing in number and size with age and by the pectorals, in youth pale with a median yellow band, in adult dusky till blackish as also the dorsal, anal and ventrals. This characters are represented in Günther's plate (86), a figure reproduced by Jordan & Evermann (Bull. U. S. Fish. Comm. XXIII. (1903) 1905, p. 193) to illustrate *C. melampygus* C. V. In both cases this species is confounded with *stellatus* or, better still, both are mixt. E. K. Jordan (Proc. U. S. Nat. Mus. LXVI. 1925 p. 15) ¹) concedes this to be the case; in a similar way Wakiya (1924) draws the attention on this point.

The opinion of Günther is repeated by Klunzinger (Fische Roth. Meer. I. 1884, p. 100) who also united *bixanthopterus* and *stellatus* with *melampygus*. His diagnosis of *melampygus* is apparently a mixture of these species, when he describes in older specimens of 40 cm. „die obere Körperhälfte schimmernd messinggelb, hellblau und schwarz gesprenkelt, die untere Hälfte mehr weiss, mit schwarzen Flecken". His earlier description (Abh. zool. bot. Ges. Wien XXI. 1871,

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1) E. K. Jordan erroneously attributes *C. stellatus* Eydoux & Souleyet (1841) to Quoy & Gaimard as authors. An error repeated by D. St. Jordan & E. K. Jordan (Mem. Carnegie Mus. X 1925, p. 40) and by D. St. Jordan & Hubbs l. c. p. 234).

p. 464) of *bixanthopterus* Rüpp. from the Red Sea is equally incorrect, when he says: „der ganze Körper von schwarzen Flecken übersprenkelt". Of this striking character, no word is to be found in the ample diagnosis of Rüppell, neither on his plate. Also Cuvier says nothing about it, while describing his *melampygus*. So much the more striking is Klunzinger's remark, that *stellatus* harmonizes in form and colouration with *melampygus* „namentlich auch in der *Besprenkelung* des Körpers". It is plausible to admit that his diagnosis, as also that of Günther, proceded from mixing both species. This is also the case with Day (Fish. India 4° 1878—88, p. 314) as far as he adds to his diagnosis of *melampygus*: „in one specimen about 13 inches in length, from the Andamans, there are small scattered spots over the body". Bean & Weed (Proc. U. S. Nat. Mus. XLII. 1912, p. 598), it is true, are of opinion that Day's diagnosis „is apparently a mixture of *C. forsteri* and *C. melampygus*", but our interpretation seems to be more probable, as *C. forsteri* C. V. is never speckled. Also the diagnosis of *melampygus*, by Barnard (Ann. S. Afric. Mus. XXI. 1925—27, p. 514) seems to be influenced by Günther, insofar as he describes the colour „with or without small dark dots". Wakiya (1924) who sharply distinguished *stellatus* from *bixanthopterus* and *melampygus*, separates the two last named as different species. But the only distinguishing characters after him are, that, compared with *bixanthopterus*, *melampygus* has the lobe of the soft dorsal and anal much higher and acuter, the nape much more elevated, the interorbital space broader, compared with the eye and a darker body". This separation seems to us not to stand the test, regarding the variability of the species of *Caranx* according to age and sex.

The foregoing reflection was written, when we received in August 1930, by the kindness of the Bishop Museum the masterly memoir of Fowler „Fishes of Oceania in Memoirs of the Bishop Museum X, 1928". He describes on p. 146 *C. melampygus*, but mixes its synonymy — after our opinion wrongly — with *C. stellatus* Eyd. & Soul. and unites both under the name *Caranx ascencionis* (Osbeck), the validity of the names of Osbeck being questioned, even supposing that Osbeck's species *Scomber ascencionis* from the South-Atlantic is identical with *Caranx melampygus*.

Doubtful species.

3. **Caranx (Caranx) cynodon** Blkr.

We presume, that *C. cynodon* Blkr. is identical with *C.* (*C.*) *melampygus*. The small differences may be of individual nature or depending on age, especially the principal difference, that the maxillary reaches to below posterior margin of eye, in *C.* (*C.*) *melampygus* only to below anterior half of eye or anterior edge of pupil. Besides Bleeker has quoted *melampygus* in 12 papers but given only once a diagnosis of it after a juvenile specimen of 178 mm. The differences which he observed between *melampygus* and *cynodon* are of no intrinsic value. For comparison we place here the diagnosis of *cynodon*.

Caranx cynodon Bleeker, Nat. Tijdschr. Ned. Indië I. 1851, p. 362. — Makreel. Vissch. Verh. Bat. Gen. XXIV. 1852, p. 57.
? *Caranx tapeinosoma* Bleeker, Amboina, Act. Soc. Sc. Indo-neerl. I. 1856, p. 44.
Caranx cynodon Günther, Cat. Brit. Mus. II. 1860, p. 447.
? *Carangus tapeinosoma* Bleeker, Ned. Tijdschr. Dierk. II. 1865, p. 290 (name only).
Caranx cynodon Kner, Novara-Exp. Fische 1865—67, p. 158.
Caranx cynodon Evermann & Seale, Bull. Bur. Fish. XXVI. 1906, p. 64 [1]).

D.^{1} (I procumbent) VIII; D.^{2} I 21; A. II, I 17.

Oblong-elongate, compressed, height about 4 in total length; dorsal profile strongly convex, ventral more straight, rostrodorsal line regularly rounded. Head obtuse, strongly convex, about 4 in total length, slightly longer than high. Eye $4—4^1/_2$ in head; praeorbital much lower than diameter of eye; upper jaw almost or not protractile, terminating below posterior part of eye; lower jaw prominent. Teeth in upper jaw pluriseriate, the outer series enlarged; in lower jaw uniseriate, anteriorly with two to four canines; vomer, palatines and tongue toothed. Cheeks, opercular apparatus and breast totally scaled; anterior part of lateral line curved, becoming straight below first fifth of soft dorsal, posteriorly armed with 34—38 scutes, the broadest 6 or 7 times in height of body. Spinous dorsal lower than soft dorsal, no rays prolonged into a filament; anal spines subequal; pectorals falcate, much longer than head; ventrals twice shorter than head; caudal with acute lobes, about $4^1/_2$ in length of body. Colour dorsally shining green, silvery below; a large black supraopercular and axillary blotch; dorsal fins violescent-hyaline; pectorals yellowish; ventrals white, anal violescent-hyaline with a white margin; caudal posteriorly with a black margin, the dorsal lobe violet-black, the ventral yellow with a white point. Length up to 400 mm. [After BLEEKER].

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[1]) Evermann & Seale (l. s. c.) give the following description of a „fine specimen, length 13 in.: head 3.4 in length, depth 2.9, eye 3.85 in head; snout 3.75; pectorals long and falcate, 2.75 in length; maxillary 2 in head, its distal end on line with posterior margin of eye".

Nom. indig.: Kuweh lilin (Malay. Batavia).

Habitat: Sumatra (Benkulen, Siboga); Nias; Java (Batavia); Ambon (*tapeinosoma*).

4. **Caranx (Caranx) stellatus** Eyd. & Soul. [Fig. 48 p. 242] [1]).

Caranx caeruleopinnatus Cuvier & Valenciennes, Hist. nat. Poiss. IX. 1833, p. 119 (nec Rüppell).
Caranx stellatus Eydoux & Souleyet, Voy. „la Bonite", Zool. T. I. P. II, 1841, p. 167.
Caranx punctatus Bleeker, Verh. Batav. Gen. XXV. 1853, p. 44.
Caranx stellatus Jouan, Mém. Soc. Sc. Nat. Cherbourg XVII. (sér. 2, VII), 1873, p. 91.
Caranx melampygus Günther, Fische Südsee II. Journ. Mus. Godeffroy 1876, p. 133 (p. p.).
Carangus Quoyi Bleeker, Arch. néerl. Sc. nat. XIII. 1878, p. 50.
Caranx melampygus Day, Fish. India 4° 1876—1888, p. 214 (p. p.).
Caranx melampygus Macleay, Proc. Linn. Soc. N. S. Wales VII. 1882, p. 355 (nec C. V.).
Caranx caeruleopinnatus Sauvage, Hist. Nat. Poissons Madagascar, Paris 1891, p. 331 (nec Rüppell).
Carangus melampygus Jordan & Evermann, Bull. U. S. Fish. Comm. XXIII. (1903) 1905, p. 192 (nec C. V.).
Caranx melampygus Jordan & Seale, Bull. Bur. Fish. XXV (1905) 1906 p. 230.
Caranx melampygus McCulloch, Mem. Queensland Mus. VIII. 1924, p. 70 (p.p.).
Caranx stellatus Jordan & Jordan, Mem. Carnegie Mus. X. 1922—25, p. 40.
Caranx stellatus E. K. Jordan, Proc. U. S. Nat. Mus. Wash. LXVI. 1925, p. 15.
Caranx stellatus McCulloch, Rec. Austral. Mus. XV. 1926, p. 33.
Xurel stellatus Jordan, Evermann & Clark, Check List Fish. North & Middle America, Washington 1930, p. 273.

$D.^1$ (I procumbent) VII, $D.^2$ I 24; A. II—I, 18—20.

Body rather short, strongly compressed, dorsal profile elevated but in the middle more or less straight to soft dorsal, thence strongly declivous to caudal peduncle; ventral profile nearly straight to soft anal, thence strongly ascending, height about 2.8 in length. Head rather short, 3.4 in length, as high

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1) See note on page 250.

as long, rostro-occipital line nearly straight. Eye 6 or more in head, situated above axis of body in middle of head, much shorter than snout and than convex, trenchant interorbital space. Posterior adipose eyelid well developed. Mouth moderate, slightly oblique, the maxillary reaching to middle of eye and its distal width is less than half the length of the snout. Teeth in upper jaw in a narrow villiform band with an outer row of strong conical teeth; in lower jaw a single row of less strong conical teeth; on vomer a triangular patch, on palatines a broad band, on tongue a median band of minute teeth. Anterior part of lateral line running nearly straight till below fourth dorsal spine, thence curving downward till below eighth to tenth dorsal ray, where the posterior part begins, which is furnished with about 30—35 scutes, increasing in size posteriorly; both parts of nearly equal length. Breast scaly. Dorsal spines rather weak, the longest more than 4 in head; anterior dorsal and anal rays forming an elevated lobe, that of the dorsal 1.2 to 1.25, that of the anal nearly twice in head, both with a scaly sheath. Pectorals falcate, 2.75 in length, reaching to about fourth anal ray; ventrals short, nearly 2.5 in head. Caudal widely forked, the lower lobe somewhat longer. Colour in young silvery with irregular dark spots, with age dusky and the spots more numerous and larger; ventrals dusky; pectorals pale in young, with a median yellow stripe, becoming dusky with age; dorsal, anal and ventrals and caudal lobes black in adult. Length 600 mm.

Habitat: New Guinea. — Madagascar, Australia (Queensland), Hawaiian Islands, Marshall Islands, Revillagigedo Islands, Pacific Ocean generally.

5. **Caranx (Caranx) sansun** (Forsk.).

Scomber sansun Forskål, Descr. animal. 1775, p. 55.

Caranx jarra Bleeker, Makreel. Vissch. Verh. Bat. Gen. XXIV. 1852. p. 58. — Achtste Bijdr. Vissch. Sumatra, Acta Soc. Sc. Indo-Neerl. VIII. 1860, p. 29 (nec C. V.).

Carangus jarra Bleeker, Poiss. Ambon. Nederl. Tijdschr. Dierk. II. 1865, p. 290 (name only).

Caranx jarra Jordan & Evermann, Proc. U. S. Nat. Mus. XXV. 1902, p. 337 (nec C. V.).

Caranx jarra Günther, Cat. Brit. Mus. II. 1860, p. 446 (nec C. V.).

Caranx jarra Day, Fish. India 4° 1878—88, p. 215 (nec C. V.).

Tricropterus jarra Jordan & Starks, Ann. Carnegie Mus. XI. 1917, p. 442.

Caranx sansun Wakiya, Ann. Carnegie Mus. XV. 1924, p. 197.

D.[1] (I procumbent) VIII, D.[2] I 22—23; A. II, I 18.

Oblong, compressed, dorsal profile more convex than ventral, which is nearly straight till anal; height 2.2—2.8 in length. Head 3.6 in length, as high as long, obtuse, the rostro-dorsal line convex, anteriorly somewhat abrupt. Eye 4—4.75 in head, with a broad posterior adipose eyelid, shorter than snout, situated in anterior half of head; least height of praeorbital less than half diameter of eye, tubulate anteriorly. Commencement of gape of mouth opposite lower edge of eye. Lower jaw slightly prominent, upper terminating below anterior half of eye, little protractile. Breast laterally scaly, ventrally naked with a small median patch of minute scales; scaly on cheeks, top of operculum and behind eyes. Anterior part of lateral line forming a low, somewhat undulating arch till below fifth to seventh dorsal ray, shorter than straight portion, which has about 36 scutes, the broadest below end of soft dorsal and about 8 to 9 times in height of body. Teeth in upper jaw villiform with an outer row of enlarged conical teeth, in the lower jaw in a single series, with larger ones intermixed; villiform on vomer, palatines and tongue. Spinous dorsal and anal lower than the somewhat elevated first dorsal rays, the highest being equal to $1^2/_3$ in height of body. Soft dorsal and anal with an anterior lobe, without prolonged rays; their base with a scaly sheath. Pectorals falciform, longer than head, ventrals twice shorter than head; caudal lobes equal. Colour greenish above, lighter below, top and margin of soft dorsal blackish, fins otherwise hyaline; caudal with the top and margin dusky. Length up to 300 mm.

Habitat: Sumatra (Siboga); Ambon!. — Red Sea, British India, Ceylon, Formosa, Japan, Riu Kiu Islands.

6. **Caranx (Caranx) ignobilis** (Forsk.).

Scomber ignobilis Forskål, Descr. animal. 1775, p. 55.

Caranx sansun Rüppell, Atl. Reise, nördl. Afrika 1826—1831, p. 101. — Neue Wirbelth. Fische 1835—1840, p. 48.

Caranx sansun Günther, Cat. Brit. Mus. II. 1860, p. 447.

Caranx sansun Klunzinger, Abh. zool. botan. Ges. Wien XXI. 1871, p. 466.

Carangus sansun Bleeker, Enumér. Poissons Madagascar 1875, p. 99. — Verh. Akad. Amsterdam XVIII. (1877) 1878, p. 18.

? *Caranx sansun* Day, Fish. India 4° 1878—88, p. 216.

Caranx ignobilis Klunzinger, Sitzber. Akad. Wien 1880, p. 377. — Fische Roth. Meer. 1884, p. 100.

Caranx ignobilis Macleay, Proc. Linn. Soc. N. S. Wales IX. 1884, p. 24.
Caranx ignobilis Steindachner, Denkschr. Akad. Wien, LXX. 1900, p. 495.
Carangus hippoides Jenkins, Bull. U. S. Fish. Comm. XXII. (1902) 1904, p. 443.
Carangus ignobilis Jordan & Evermann, Bull. U. S. Fish. Comm. XXIII. (1903) 1905, p. 188 (salve synonyma).
Caranx ignobilis Jordan & Seale, Bull. Bur. Fish. XXV. (1905) 1906, p. 231.
Caranx ignobilis Jordan & Seale, o.c. XXVI. (1906) 1907, p. 14.
Caranx ignobilis Jordan & Richardson, o.c. XXVII. 1908, p. 250.
Caranx ignobilis Kendall & Goldsborough, Mem. Mus. Comp. Zool. Cambridge XXVI. 1911, p. 269.
Caranx ignobilis M. Weber, Siboga-Exp. Fische 1913, p. 398.
Caranx ignobilis McCulloch, Biol. Results „Endeavour" III. 1915, p. 126.
Caranx ignobilis D. St. Jordan & E. K. Jordan, Mem. Carnegie Mus. X. 1922—25, p. 39.
Caranx ignobilis Wakiya, Ann. Carnegie Mus. XV. 1924, p. 193.
Caranx jarra Wakiya, l. c. p. 196.
Caranx ignobilis Fowler, Proc. Acad. Nat. Sc. Philadelphia LXXVII. 1925, p. 215.
Caranx ignobilis E. K. Jordan, Proc. U. S. Nat. Mus. LXVI. 1925, p. 16.
Caranx ignobilis Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 545.
Caranx ignobilis Fowler, Fish. Oceania, Mem. Bishop Mus. X. 1928, p. 148.

D.^{1} (I procumbent) VIII, D.^{2} I 19—20; A. II, I 16—17.

Oblong, compressed, height over 2 to 3.2 in length; dorsal profile strongly convex till soft dorsal, thence slightly convex, ventral profile nearly straight, obliquely descending till anal, behind it as dorsal. Head somewhat more or less than 3.5, higher than long, convex, the rostro-frontal profile rather steep. Eye 3.5 to 4, with a narrow posterior adipose eyelid; situated in anterior half of head, mostly above longitudinal axis of body; its diameter shorter than snout and equal to interorbital space; praeorbital in adult 1$^1/_2$ diameter of eye. Cleft of mouth commences below level of eye; jaws subequal, the upper reaching to below centre of eye or somewhat behind it. Teeth villiform, with an outer row of enlarged but irregularly sized ones in the intermaxillaries, in a single row of irregularly sized ones in lower jaw, some being much larger than the others, and a pair of minute canines at the symphysis; villiform on vomer, palatines and tongue. Gillrakers 13 to 15 on lower part of first arch, strong. Breast ventrally naked with a very small central patch of minute scales; this naked area transgresses only slightly on lower lateral part of breast 1). Scales present on cheeks, behind eyes and on upper part

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1) This squamation differs therefore from that of the figure of Jenkins, used also by Jordan & Evermann, and is conform with that of Day, but he calls the chest scaled in opposition to *carangus* and *hippos*.

of operculum, head otherwise naked. Anterior part of lateral line moderately arched, becoming straight below sixth dorsal ray; the straight portion somewhat shorter than the arched, with about 28—30 armed scutes, the broadest $^1/_8$ to $^1/_9$ height of body, $^3/_4$ diameter of eye. Third dorsal spine longest, somewhat more than half head. Soft dorsal and anal with an elevated, somewhat falcate lobe, about $^3/_4$ of head, both fins scarcely sheathed at base. Pectorals slender, strongly falcate, extending to first fourth of anal, longer than head; ventrals twice in head; caudal deeply forked, the lobes equal. Colour greenish above, silvery below, no opercular spot; fins yellow, spinous dorsal greyish. Length over 700 mm.

Habitat: Flores!; Celebes (Kwandang!, Menado); New Guinea. — Red Sea, Zanzibar, Delagoa Bay, Madagascar, Mauritius, Seychelles, South Arabia, British India, Riu Kiu Islands, Bonin Islands, Japan, Formosa, Philippines, North western Australia, Cape York, Port Darwin, Cleveland Bay, Marquesas Islands, Laysan, Honolulu, Tahiti, Samoa, Hawaiian Islands.

7. **Caranx (Caranx) carangus** Bloch.

Scomber Carangus Bloch, Nat. Ausl. Fische VII. 1793, p. 69. — Bloch, Schneider, Syst. Ichth. 1801, p. 28.
Caranx carangus Cuvier & Valenciennes, Hist. nat. Poissons IX. 1833, p. 91.
Caranx xanthopygus Cuvier & Valenciennes, l. c. p. 109.
Caranx ekala Cuvier & Valenciennes, l. c. p. 117.
Caranx xanthopygus Bleeker, Nat. & Geneesk. Arch. Ned. Indië (3) II 1845, p. 517.
Caranx ekala Bleeker, Makreel. Vissch. Verh. Batav. Gen. XXIV. 1852, p. 59.
Caranx carangus Günther, Cat. Brit. Mus. II. 1860, p. 448.
Carangus ekala Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 235 (name only).
Caranx carangus Kner, Novara-Exped. Fische, 1865—67, p. 157.
Carangus carangus Bleeker, Ned. Tijdschr. Dierk. IV. (1871) 1872, p. 131 (name only).
Caranx carangus Day, Fish. India 4°, 1878—88, p. 215.
Caranx carangus Macleay, Proc. Linn. Soc. N. S. Wales VII. 1882, p. 356.
Caranx carangus Sauvage, Poissons Madagascar 1891, p. 325.
Caranx carangus Seale & Bean, Proc. U. S. Nat. Mus. XXXIII. 1908, p. 242.
Caranx carangus de Beaufort, Bijdr. Dierk. Leiden 1913, p. 133.
Caranx carangus Regan, Trans. Zool. Soc. London XX. 1914, p. 276.
Caranx carangus Hora, Mem. Asiat. Soc. Bengal VI. 1924, p. 484.
Caranx carangus Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 545.
Caranx xanthopygus E. K. Jordan, Proc. U. S. Nat. Mus. LXVI. 1925, p. 16.
Caranx carangus Duncker & Mohr, Mitt. Zool. Mus. Hamburg, XLIV. 1929, p. 79.

D.^{1} (I procumbent) VIII, D.^{2} I 20—22; A. II, I 16—18.

Oblong, compressed, dorsal profile convex from nape to caudal peduncle, ventral profile less so, and somewhat oblique toward anal; height 2.3—2.7 in length. Head 3.2—3.5 in length, about as long as high, its dorsal profile ascending in a slightly convex line, the nape elevated and trenchant. Eye 3.5—4, with a narrow posterior eyelid, for its major part in anterior half of head; its diameter equal to snout and interorbital space; posterior part of praeorbital in young twice, in adult less lower than that diameter. Lower jaw a little prominent, the upper reaching to below or behind centre of eye. Cleft of mouth commences opposite lower third of eye. Teeth in upper jaw in a narrow band, with an outer series of larger ones; in lower jaw in a single series intermixed with larger ones, one or two near symphysis may be caniniform. Triangular lateral area of breast towards pectorals partly scaled or at least wrinkled, ventrally naked, except a small median patch of minute scales before ventrals. Scales present also on postocular part of head and on top of opercular apparatus. Anterior part of lateral line moderately arched, terminating below fifth or sixth dorsal ray, much shorter than straight part, with 33—37 keeled scutes, becoming broader and attaining $^1/_7$—$^1/_9$ of height of body, below last third of soft dorsal. Anterior rays of dorsal, the longest of which goes less than twice in heigth of body, and those of anal forming a falciform lobe. Pectorals falciform, much longer than head, ventrals about twice shorter than head; lobes of caudal acute, equal. Colour silvery, darker above with a golden hue, four or five broad dark cross-bars in young, opercular spot usually distinct but small, fins hyaline, lobe and often the entire margin of soft dorsal and upper lobe of caudal blackish. Length more than 400 mm. [Specimens of BLEEKER's collection in Amsterdam Museum seen by us].

Nom. indig.: Kuweh lilin (Malay. Batavia); Putian (Pasuruan, Java).

Habitat: Singapore; Sumatra (Benkulen, Priaman); Java (Batavia, Prigi, Tjilatjap!); Sumbawa; Babber Island!; Celebes (Makassar, Menado); Buton!; Batjan; Ternate; Ceram; Ambon; Obi major; Mysore; New Guinea. — Beira!, Delagoa Bay, Coast of Natal!, Madagascar, Bourbon, Mauritius, Mayotte, British India, Siam, China, Japan, Philippines, Admirality Islands; ? Honululu (E. K. Jordan *xanthopygus*). Tropical Atlantic.

Note: Jordan, Evermann & Clark (Check List fish.

North & Middle America 1930, p. 273) are of opinion, that *Caranx hippos* (L.) from the Atlantic is „apparently represented in the Pacific by the closely related *Caranx ignobilis*" and that *Scomber Carangus* Bl. is a synonym of Linné's *hippos*. Many authors are not of this opinion. They follow Günther (Cat. Brit. Mus. II. 1860, p. 448) in regarding *Caranx carangus* (Bloch) as occurring in the Atlantic and Indopacific as shown in our synonymy of *Caranx* (*Caranx*) *carangus* (Bloch), which we have maintained as species, widely distributed in the Indic and in the indo-australian Archipelago.

Doubtful species.

8. Caranx (Caranx) janthinospilos Blkr.

Caranx janthinospilos Bleeker, Vischsoorten Ambon, Acta Soc. Sc. Indo-neerl. I. 1856, p. 45.

Carangus janthinospilus Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 270.

D.[1] (I procumbent) VIII, D.[2] I, 23—24; A. II, I 19—20.

Oblong, compressed, height $3^2/_3$—$3^3/_4$ in total length. Dorsal profile strongly convex, the ventral nearly straight. Head obtuse convex $4^2/_3$ in length, as high as long; rostro-dorsal profile strongly declivous, the snout and the occiput somewhat convex, before the nostrils slightly concave. Eye about 5 in head, more than half its diameter remote from the rostrofrontal line; praeorbital posteriorly somewhat lower than diameter of eye. Jaws equal, the upper moderately protractile terminating below anterior part of eye, about $2^2/_3$ in head. Teeth in lower jaws conical, subequal, the anterior are minute canines, in the upper jaw an outer series of conical teeth, about the 12 anterior of which are much longer; besides the vomerine and palatine teeth, there are patches of minute teeth dispersed on the palatine mucose membrane; the tongue shows besides a median band of teeth, patches of minute teeth especially at its periphery. Lateral pectoral triangle totally, the inferior triangle nearly totally scaled; scales very conspicuous, more than 100 in a longitudinal line; lateral line curved till below second fifth of soft dorsal; posteriorly with about 30 armed scutes, the broadest about 9 times in height of body. Fins acute, without produced rays. Spinous dorsal much lower than soft dorsal. Soft dorsal and anal emarginate, anteriorly acute, less than twice lower than body; pectorals falcate, much longer than head, reaching fifth or sixth anal ray; ventrals acute more than twice shorter than head; in the spinous anal the posterior spine the longest; caudal with acute lobes about 5 times in length of body. Colour violescent-greenish above, yellowish-silvery below; head, back and sides with small, oblong and rounded spots, widely dispersed, deep violet; spinous dorsal light violet-hyaline; soft dorsal, anal and caudal light violet anteriorly, with darker margin; pectorals yellowish hyaline; ventrals yellowish, anteriorly light violet. Length 449 mm. [After BLEEKER, not seen by us].

Nom. indig.: Bobara (Ambon).

Habitat: Ambon, Timor.

Besides the single described specimen from Ambon, Bleeker has quoted also Timor as locality.

4. Subgenus **Uraspis** Blkr.

(Bleeker, Nat. Tijdschr. Ned. Indië VIII. 1855, p. 418).

Oblong, compressed; head obtuse. Lower jaw slightly prominent. Teeth acute, curved, in upper jaw in two, in lower posteriorly in one series, or in both jaws in a single or in two series; none on vomer, palatines and tongue. Scales minute, wanting on breast. Anterior part of lateral line moderately arched; straight part with keeled scutes in its whole length. Anterior rays of dorsal and anal not elevated, their rays decreasing gradually in size. Ventrals equal to or shorter than head.

Distribution: Indo-australian Archipelago, Southern Japan, Riu Kiu Islands; tropical part of Pacific.

1. **Caranx (Uraspis) uraspis** Gthr.

Uraspis carangoides Bleeker, Nat. Tijdschr. Ned. Indië VIII. 1855, p. 418.
Caranx uraspis Günther, Cat. Brit. Mus. II. 1860, p. 444.
Caranx (*Uraspis*) *uraspis* Wakiya, Ann. Carnegie Mus. XV. 1924, p. 207.

D.^{1} (I procumbent) VIII, D.^{2} I, 28; A. II, I 21.

Oblong, compressed, dorsal profile strongly convex from snout to caudal peduncle, ventral profile nearly straight till anal, thence ascending in a convex line to caudal peduncle, height 2.35 in length. Head 3.30 in length, obtusely convex. Eye more than 4 in head (3.2 in young of 60 mm.), shorter than obtuse snout, longer than height of praeorbital, situated in anterior half of head, above longitudinal axis of body. Mouth oblique, lower jaw slightly prominent, the upper reaching to below middle of eye; only slightly protractile. Teeth in jaws very conspicuous, acute, curved; in upper jaw in two series, in the lower posteriorly uniserial, none on vomer, palatines and tongue. Scales minute, wanting totally on breast; anterior part of lateral line moderately arched, becoming straight below thirteenth dorsal ray, the straight part slightly shorter, with about 32 armed scutes, the broadest about 14 times in height of body. Spinous dorsal weak, its height 2.35 in that of soft dorsal, which is more than length of head; anal somewhat lower; both fins not emarginate, decreasing gradually in size posteriorly. Free anal spines rudimentary, hidden under skin in adult. Caudal emarginate, the lobes only slightly acute. Pectorals shorter than head; ventrals long, equal to head and extending on anal. Colour greenish above, silvery below, crossed by 6 dark vertical bands continued on dorsal and anal; spinous dorsal and ventral black; caudal dusky in its posterior half. Length 172 mm.

Habitat: Nias!; Ambon. — Japan, Riu Kiu Islands.

Note: Wakiya (l. s. c.) says about this species, which is easily to recognise by the length of its ventrals, unique among *Carangidae*, that it is distributed throughout the Indian Ocean and the tropical seas of the Pacific. This is rather exaggerating, as besides the specimen from Nagasaki, described by Wakiya, there is only known the specimen of Bleeker from Ambon, from the year 1855, and a young specimen which the Amsterdam Museum recently received from a coralreef at Nias, near Sumatra.

5. Subgenus **Selaroides** Blkr.

(Bleeker, Nat. Tijdschr. Ned. Indië I. 1851, p. 352. — Makreel. Vissch. Verh. Bat. Gen. XXIV. 1852, p. 71 & 87).

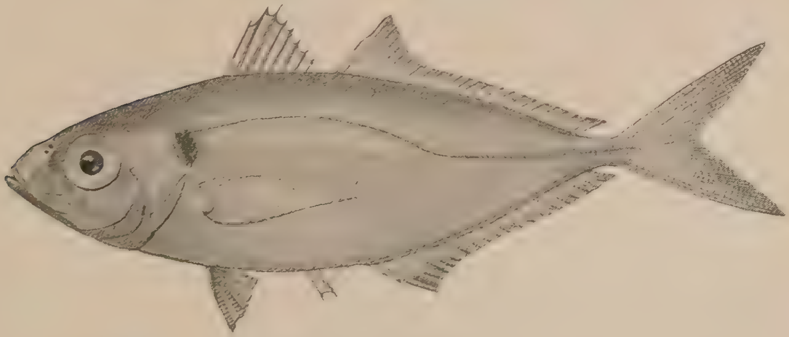

Fig. 49. *Caranx (Selaroides) leptolepis* C. V., $^2/_3$ nat. size.

Oblong, elongate, compressed; head pointed. Lower jaw slightly prominent, the upper much protractile into a horizontal tube. A single series of minute teeth on lower jaw and more or less rudimentary ones on tongue, none on upper jaw, vomer and palatines. Breast scaled. Anterior part of lateral line scarcely arched, becoming straight below tenth dorsal ray, with 25—30 small scutes. Anterior rays of dorsal and anal slightly elevated.

Distribution: That of the single species known.

1. **Caranx (Selaroides) leptolepis** C. V. [Fig. 49 p. 261].

Caranx leptolepis Cuvier & Valenciennes, Hist. Nat. Poiss. IX. 1833, p. 63.
Caranx leptolepis Bleeker, Nat. & Geneesk. Arch. Ned. Ind. (3) II. 1845, p. 517. — Journ. Ind. Arch. III. (1848) 1849, p. 71, 72.
Caranx leptolepis Cantor, Journ. Asiat. Soc. Bengal, XVIII. 1850, p. 1108.
Selaroïdes leptolepis Bleeker, Nat. Tijdschr. Ned. Indië II. 1851, p. 213.
Leptaspis leptolepis Bleeker, Makreel. Vissch. Verh. Batav. Gen. XXIV. 1852, p. 71, 87.
Caranx leptolepis Günther, Cat. Brit. Mus. II. 1860, p. 440.
Caranx bidii Day, Proc. Zool. Soc. London 1873, p. 237.
Caranx cheverti Alleyne & Macleay, Proc. Linn. Soc. N. S. Wales I. 1877, p. 324 (fide McCulloch).
Caranx leptolepis Macleay, Descr. Cat. Austral. Fish. I. 1881, p. 168.
Caranx Cheverti Macleay, l. c. p. 169.
Caranx leptolepis Sauvage, Bull. Soc. Philom. (7) V. 1881, p. 106.
Caranx procaranx De Vis, Proc. Linn. Soc. N. S. Wales IX. 1884, p. 540 (fide McCulloch).
Caranx leptolepis Day, Fish. India 4° 1878—88, p. 225.
Caranx leptolepis Boulenger, Proc. Zool. Soc. 1889, p. 240.
Carangus leptolepis Jordan & Evermann Proc. U. S. Nat. Mus. XXV. 1902, p. 337.
Caranx leptolepis Jordan & Richardson, Bull. Bur. Fish. 1908, p. 250.
Caranx leptolepis Bean & Weed, Proc. U. S. Nat. Mus. XLII. 1912, p. 599.
Caranx leptolepis M. Weber, Siboga-Exp. Fische, 1913, p. 397.
Caranx leptolepis McCulloch, Biol. Res. „Endeavour" III. 1915, p. 129. — Mem. Queensl. Mus. VIII. 1924, p. 72
Caranx (*Selaroides*) *leptolepis* Wakiya, Ann. Carnegie Mus. XV. 1924, p. 208.
Gnathanodon leptolepis Fowler, Fish. Oceania, Mem. Bishop Mus. X. 1928, p. 150.

D.^{1} VIII, D.^{2} I. 25; II, I. 20.

Oblong, elongate, compressed, ventral profile till anal less convex than dorsal, otherwise both profiles nearly equally curved; height 3.2—3.5 in length. Head pointed, 3.4—3.5 in length, longer than high, its rostro-frontal profile nearly straight with a shallow impression above nostrils. Eye 3.2 to more than 3.5 in head, with a broad posterior and a narrower anterior adipose eyelid, the former reaching on pupil, situated, in middle of head; its diameter about equal to snout, $^2/_3$ longer than height of praeorbital posteriorly. Lower jaw slightly prominent, the upper terminating below frontborder of eye or somewhat behind it; much protractile into a horizontal tube. Minute teeth in a single series on lower jaw and more or less in a rudimentary state on tongue, wanting on upper jaw, vomer and palatines. 26 Gillrakers, finely tuberculated, the longest more than half diameter of eye. Small but conspicuous scales on body, also on breast; present on cheeks, praeoperculum, top of operculum and on temporal and occipital region. Lateral line scarcely arched, with rounded sensory scales becoming straight below tenth dorsal ray; the straight portion nearly one third shorter than the anterior, the scales becoming more shield-like in the posterior third, the hindermost scarcely armed, the broadest about 12—14 times in height of body. Anterior dorsal spines, about half height of body, their height, equalling about that of slightly elevated anterior rays of soft dorsal and anal, both fins with a scaly basal sheath; caudal forked, lobes equal; pectorals falcate, in adult longer than head; ventrals half length of head. Colour greenish above, silvery below; in fresh state, according to Bleeker and Day with a broad, golden oculo-caudal band; a distinct black opercular spot encroaching on shoulder; fins hyaline. Length 160 mm. [Specimens of BLEEKER's collection in Amsterdam Museum seen by us].

Nom. indig. Selar kuning (Malay. Batavia).

Habitat: Singapore; Pinang; Sumatra (Telok betong); Java (Batavia); Flores!; Celebes (Makassar!, Bonthain, Bulukomba, Badjoa); Ambon; South coast New Guinea. — Muscat, British India, Ceylon, Tonkin, China (Swatow), Riu Kiu, Formosa, Philippines, Australia (Queensland, Cape York). In sea.

6. Subgenus **Gnathanodon** Blkr.

(Bleeker, Nat. Tijdschr. Ned. Indië I. 1851, p. 352. — Makreel. Visschen, Verh. Bat. Gen. XXIV. 1852, p. 72).

Oblong, compressed; head large; eye above longitudinal axis of body, in middle of head. Lower jaw slightly shorter, the upper strongly protractile into a subhorizontal tube. Teeth early wanting; tongue rough by minute denticulation. Scales small, minute on breast. Anterior part of lateral line moderately arched, posterior part with 15 feeble scutes. Anterior dorsal and anal rays forming an elevated but not falcate lobe.

Distribution: that of the single species known.

1. **Caranx (Gnathanodon) speciosus** (Forsk.) [Fig. 50 p. 265].

Scomber rim, *speciosus* Forskål, Descr. Animal. 1775, p. 54.
Caranx speciosus Lacepède, Hist. nat. Poissons III. 1802, p. 72.
Caranx petaurista Isid. Geoffroy, Descr. de l'Egypte, Poissons 1809, p. 325.
Caranx speciosus Cuvier & Valenciennes, Hist. nat. Poiss. IX. 1833, p. 130.
Caranx speciosus Richardson, Ann. Mag. Nat. Hist. XI. 1843, p. 28. — Zool. Erebus & Terror, 1846, p. 136.
Caranx speciosus Bleeker, Nat. & Geneesk. Arch. Ned. Ind. (3) II. 1845, p. 517 (name only).
Caranx speciosus Cantor, Journ. Asiat. Soc. Bengal, XVIII. 1850, p. 1115.
Gnathanodon speciosus Bleeker, Nat. Tijdschr. Ned. Ind. I. 1850, p. 160 (first use of *Gnathanodon* without description).
Gnathanodon speciosus Bleeker, Nat. Tijdschr. Ned. Ind. III. (1851) 1852, p. 57. — Makreel. Vissch. Verh. Bat. Gen. XXIV. 1852, p. 72.
Caranx speciosus Peters, Monatsber. Akad. Berlin 1855, p. 438.
Caranx speciosus Günther, Cat. Brit. Mus. II. 1860, p. 444.
Caranx speciosus Playfair & Günther, Fish. Zanzibar 1866, p. 61.
Caranx speciosus Klunzinger, Abh. zool. bot. Ges. Wien XXI. 1871, p. 455.
Caranx petaurista Klunzinger, l. c. p. 456.
Gnathanodon petaurista Bleeker, Enum. Poiss. Madagascar, 1875, p. 99.
Caranx edentulus Alleyne & Macleay, Proc. Linn. Soc. N. S. Wales, I. 1877, p. 327.
Caranx speciosus Macleay, Descr. Cat. Austral. Fish. I. 1881, p. 169.
Caranx speciosus Macleay, Proc. Linn. Soc. N. S. Wales VII. 1882, p. 356.
Caranx obtusiceps Macleay, l. c. p. 357.
Caranx speciosus Day, Fish. India 4° 1878—88, p. 168.
Caranx (*Hypocaranx*) *speciosus* Klunzinger, Fische Roth. Meer. 1884, p. 96.
Caranx cives de Vis, Proc. Linn. Soc. N. S. Wales IX. 1884, p. 540.
Caranx (*Hypocaranx*) *speciosus* Steindachner, Denkschr. Akad. Wien. LXX. 1900, p. 495.
Caranx speciosus Jenkins, Bull. U. S. Fish. Comm. XXII. (1902) 1904, p. 447.
Caranx speciosus Jordan & Evermann, l. c. XXIII. (1903) 1905, p. 197.
Caranx speciosus Jordan & Seale, Bull. Bur. Fish. XXV. (1905) 1906, p. 232.
Caranx speciosus Seale, Philippine Journ. Sci. V. 1910, p. 270.
Caranx speciosus M. Weber, Siboga-Exp. Fische 1913, p. 397.
Caranx speciosus Ogilby, Mem. Queensl. Mus. III. 1915, p. 67.
Caranx (*Gnathanodon*) *speciosus* Wakiya, Ann. Carnegie Mus. XV. 1924, p. 209.
Caranx speciosus Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 548.
Gnathanodon speciosus Fowler, Fish. Oceania, Mem. Bishop Mus. X. 1928, p. 149.

D.^{1} (I procumbent) VII—VIII, D.^{2} I. 18—21; A. II, I 16—17.

Oblong, dorsal profile from snout to caudal peduncle evenly convex and in its anterior half much more elevated than ventral profile, height 2.3—2.9 in length; head 3—3.30 in length, large, slightly higher than long, its rostro-occipital profile evenly convex. Eye, according to age, 3.6 to more than 5, situated in middle of head, above longitudinal axis of body, its diameter much shorter than snout and about $^1/_3$ longer than postorbital posteriorly; adipose eyelid anteriorly and posteriorly moderately developed; mouth oblique, lower jaw slightly shorter; the upper, reaching in young to frontborder of pupil, in adult to frontborder of eye, strongly protractile into a subhorizontal tube. Teeth wanting, at least already in specimens less than 100 mm. in length; tongue rough by minute denticulation. About 20 gillrakers on lower part of first arch, shorter than eye-diameter. Scales small, minute on breast, which they cover totally, present on middle part of cheeks, on postorbital region, top of operculum and temporal and nuchal region, the crested occiput and head otherwise naked. Anterior part of lateral line moderately curved, slightly longer than straight part, which commences about below eighth dorsal ray and is weakly armed in its posterior half with about 15 feeble scutes, increasing in size with age, the broadest reaching about $^1/_{12}$ of height of body. Dorsal spines weak, the second the longest and 2.5 to more than thrice in head; anterior dorsal and anal rays forming a somewhat elevated but not falcate lobe. Caudal forked, with equal lobes. Pectorals in young shorter, in adult till about $^1/_5$ longer than head; ventrals twice or more shorter than head. Colour silvery with a golden hue, darker on back, with 8—10 (exceptionally 12) transversal blackish bands, broader and smaller usually alternating, the first oblique through eye, the second crossing back and operculum; generally more pronounced in young specimens, they may fade later on or disappear totally; fins yellowish with dusky tips. Length up to 915 mm.

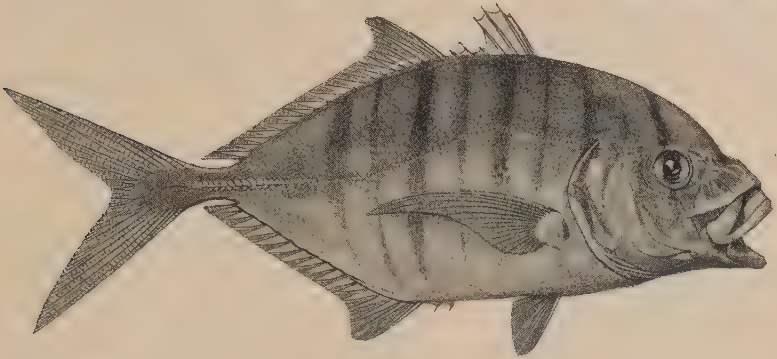

Fig. 50. *Caranx* (*Gnathanodon*) *speciosus* (Forsk.) $^1/_2$ nat. size.

Nom. indig.: Kuweh (Malay. Batavia); Badong (Malay. Semarang); Bibara potong potong (Ternate).

Habitat: Penang; Singapore; Sumatra (Benkulen); Banka; Biliton; Bintang; Riouw; Java (Batavia, Tanara); Madura; Flores!; Borneo (Sandakan); Celebes (Makassar!, Badjoa, Menado); Saleyer!; Duizend Islands; Ambon; Ternate; Ceram; Waigeu; Goram; New Guinea. — Red Sea, Zanzibar, Mossambique, Coast of Zululand, Madagascar, Mauritius, Seychelles, Muscat, British India, Ceylon, Andamans, Malay Peninsula, Formosa, Philippines, Torres Straits, Australia (Queensland, West-Australia), Hawaiian Islands, Fiji, Mazatlan to Panama. In sea.

5. **Ulua** Jordan & Snyder.

(Jordan & Snyder, Mem. Carnegie Mus. IV. 1908, p. 39).

Gillrakers very numerous, exceedingly long, featherlike in shape, projecting into the mouth on each side of the tongue. Lips sharp-edged. Breast entirely naked before a line between the pectoral and ventral fins. A single row of minute teeth in jaws; a patch of microscopic teeth on vomer and a very narrow band on each palatine. Body greatly compressed, its profiles angular.

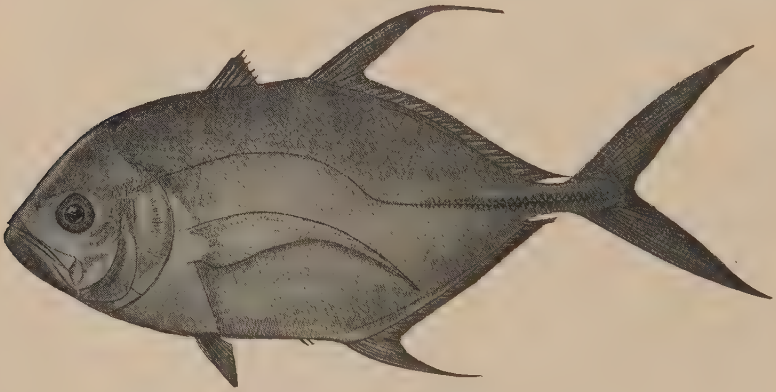

Fig. 51. *Ulua mandibularis* (Macleay) 4/11 nat. size.

1. **Ulua mandibularis** (Macleay). [Fig. 51 p. 266].

Caranx mandibularis Macleay, Proc. Linn. Soc. N. S. Wales VIII. 1883, p. 356.
Caranx mandibularis Jordan & Seale, Bur. Fish. XXV. (1905) 1906, p. 234.
Ulua mandibularis McCulloch, Biol. Res. „Endeavour" III. 3, 1915, p. 140. — Mem. Queensl. Mus. VIII. 1924, p. 75.
? *Caranx mandibularis* Fowler & Bean, Proc. U.S. Nat. Mus. LXII. 1922, p. 20.
Carangoides mandibularis Fowler, Fish. Oceania, Bishop Mus. X. 1928, p. 151.

D.^{1} VII—VIII; D.^{2} I 20—21; A. II, I 17—18.

Strongly compressed; dorsal profile more arched than lower profile; strongly convex and trenchant from snout to soft dorsal, height 2.1—2.24 in length; head about 3.4 in length, with an elevated nape and a slight concavity on the snout. Eye 3.5 in head, equal to snout and slightly less than interorbital space. Adipose eyelid forming a narrow rim round the eye. Jaws about equal, the chin projecting, forming an obtuse angle in advance of the upper jaw, which extends to below anterior border of pupil or nearly to centre of eye. Gape of mouth commences opposite lower border of eye. Cheeks, top of operculum and a small area of temporal region scaly, head otherwise naked; scales on body small, wanting on base of pectorals and on breast before a line descending from pectorals to behind base of ventrals. Anterior part of lateral line conspicuously arched, becoming straight below eighth or ninth dorsal ray; the curved part sligthly shorter than the straight part, the posterior portion of which has about 30 to 32 somewhat stronger scutes. A single row of minute teeth in jaws; a patch on vomer; palatines and tongue apparently toothless. About fifty to fifty five very long gillrakers on lower limb of first arch, projecting till vomer; the longest somewhat shorter than eye. Dorsal spines weak, the third the highest, about equalling eye. Anterior rays of dorsal forming a falcate lobe, the first ray produced and much longer than length of head; lobe of anal shorter; the remainder of both fins subequal, with a high basal scaly sheath in the anterior three-fourths of their length. Caudal deeply forked, the lobes equal. Pectorals strongly falcate, almost one third longer than head, extending about to middle of anal; ventrals short. Colour greenish above, silvery below; margin of caudal and anal blackish; pectoral axil black. Length 288 mm.

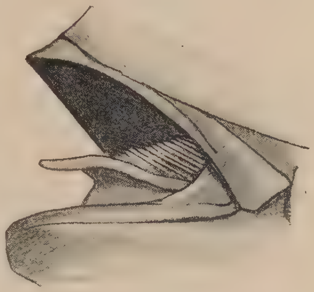
Fig. 52. Open mouth of *Ulua mandibularis* (Macleay), to show a part of the numerous, long gillrakers which project into the mouth on each side of the prominent tongue.

Nom. indig.: Termmau (Balikpapan).

Habitat: Borneo (Balikpapan!); New Guinea (Port Moresby). — Pelew Islands, Gulf of Carpentaria, (Formosa?).

6. Alectis Rafinesque.

(Rafinesque, Analyse de la Nature, 1815, p. 84).

Blepharis Cuvier, Règne anim. ed. I^a, II, 1817, p. 322.
Scyris Cuvier, Règne anim. ed. II^a, II, 1829, p. 209.
Gallichthys Cuvier & Valenciennes, Hist. nat. Poiss. IX. 1833, p. 168.

Body strongly compressed, of nearly orbicular or deep rhombic form, the dorsal and ventral profile angular, the height decreasing with growth. The minute scales deeply embedded and inconspicuous; anterior part of lateral line strongly curved, becoming straight below middle of soft dorsal, which part has posteriorly a few, weakly armed minute scutes. Mouth moderate, protractile, its cleft getting more horizontal in adult. Head partially scaled, its rostro-nuchal contour and breast trenchant, more so in young. Villiform teeth on jaws, vomer, palatines and tongue, usually disappearing with age. Adipose eyelids more or less rudimentary. First dorsal, preceded by a procumbent, hidden spine, with V—VI rudimentary spines, not connected by membrane, more or less disappearing with age in the soft tissue. Soft dorsal and anal about equal, the anterior rays produced into long filaments, becoming shorter with age; no finlets behind soft dorsal and anal. Pectorals long, falcate; ventrals inserted before pectorals, the rays greatly produced in the young, rapidly decreasing in length with advancing age. Caudal forked, the lobes rounded. The general form changes extremely with different age and induced to establish numerous species and genera.

Distribution: In littoral water of tropical and subtropical seas. Lütken[1]), demonstrating the metamorphic influence of age, and before him Günther, has reduced the genera to a single genus and four species. He tried at the same to solve the question, if the species of *Alectis* (called by him *Gallichthys* Cuv.) are of worldwide distribution over the tropical oceans or if the westindian *A. crinitus* (Mitch.) and the mediterranean and westafrican *alexandrinus* Cuv. are restricted to the tropical and subtropical Atlantic, and *A. ciliaris* (Bloch) and *indicus* (Rüpp.) to the tropical and subtropical Indo-pacific.

We suppose, that this is the most probable solution and follow it in our synonymy.

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1) Lütken, Spolia Atlantica, Vidensk. Selsk. Skr. (5) XII. 1880, p. 538 and 603.

Key to the indo-australian species of Alectis.

Depth of praeorbital not higher than diameter of eye; gillrakers long and slender. . . . . 1. *A. ciliaris* p. 269.

Depth of praeorbital much higher (nearly twice) than diameter of eye; gillrakers short and stout. . . . . 2. *A indica* p. 271.

1. Alectis ciliaris (Bloch).

Zeus ciliaris Bloch, Ausl. Fische VI. 1788, p. 29.
Zeus ciliaris Bloch, Schneider, Syst. Ichth. 1801, p. 94.
Scomber filamentosus Bloch, Schneider, l. c. p. 34.
Blepharis fasciatus Rüppell, Atl. Fische Roth. Meer. 1828, p. 129.
Blepharis indicus Cuvier & Valenciennes, Hist. nat. Poiss. IX. 1833, p. 154.
Blepharis major Cuvier & Valenciennes, l. c. p. 163.
Blepharis indicus Schlegel in Temminck & Schlegel, Fauna japonica 1846, p. 113.
Carangoides blepharis Bleeker, Makreel. Vissch. Verh. Batav. Gen. XXIV. 1852, p. 67. — Nat. Tijdschr. Ned. Ind. III. 1852, p. 235.
Caranx ciliaris Günther, Cat. Brit. Mus. II. 1860, p. 454.
Caranx ciliaris Playfair & Günther, Fish. Zanzibar, 1866, p. 62.
Caranx ciliaris Klunzinger, Abh. zool. bot. Ges. Wien XXI. 1871, p. 454.
Caranx ciliaris Günther, Fische Südsee, 1876, p. 135.
Caranx ciliaris Day, Fish. India 4°, 1878—1888, p. 224.
Gallichthys ciliaris Lütken, Spolia atlantica 1880, p. 539.
Caranx ciliaris Macleay, Descr. Cat. Austr. Fish. I. 1881, p. 172.
Scyris ciliaris Klunzinger, Fische Roth. Meer., 1884, p. 101.
Blepharis ciliaris Sauvage, Poissons Madagascar, 1891, p. 518 (name only).
Alectis ciliaris Jordan & Evermann, Bull. Bur. U. S. Fish. Comm. XXIII. (1903) 1905, p. 200.
Scyris ciliaris de Beaufort, Bijdr. Dierk. 1913, p. 133.
Alectis ciliaris Ogilby, Mem. Queensl. Mus. III. 1915, p. 88 (s. syn.).
Alectis ciliaris McCulloch, Check-list fish. N. S. Wales II. 1919, p. 53.
Alectis ciliaris Wakiya, Ann. Carnegie Mus. XV. 1924, p. 213.
Alectis indicus Wakiya, l. c. p. 214 1).
Alectis temmincki Wakiya, l. c. p. 215 1).
Alectis breviventralis Wakiya, l. c. p. 216 1).
Alectis ciliaris D. St. Jordan & E. K. Jordan, Mem. Carnegie Mus. X. 1922—25, p. 41 (name only).
Alectis ciliaris Jordan & Hubbs, l. c. p. 224.
Alectis ciliaris Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 549.
Blepharis ciliaris Fowler, Fish. Oceania, Mem. Bishop Mus. X. 1928, p. 151 2).

D.^{1} VI (disappearing with age), D.^{2} I 19—22; A. II (disappearing with age) I, 15—17.

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1) After studying the excellent paper of Lütken (Spolia atlantica, Vidensk. Selsk. Skr. (5) XII. 1880, p. 538 and 603), the reader will be inclined, to take the different species of Wakiya as different phases of one species, characterized by the great changes in form of body and in length of finrays in different age.

2) The eggs and larvae of *Alectis ciliaris* are described by Delsman, Treubia VIII, 1923, p. 216.

Much compressed, rhombic, angular, elevated, more so in young; height 1.2 to nearly 2 in length. Head 2.5 to about 3 in length, its rostro-dorsal profile steep till eye, thence ascending in an oblique line till dorsal fin, producing a supra-occipital gibbosity, more pronounced in old specimens. Eye according to size 2.5 to more than 3.5, height of praeorbital less than diameter of eye. Snout rather short, rounded, chin prominent, gape of mouth getting less oblique with age. Maxillary extending to or somewhat beyond frontborder of pupil. Anterior part of lateral line arched, becoming straight about below 10th dorsal ray, the straight part about equal to curved part, with 10—15 feeble scutes posteriorly. The anterior six or seven rays of soft dorsal and the anterior four or five anal rays exceedingly produced into filaments, becoming somewhat shorter with age, but surpassing the caudal; the following rays of equal length; the basal sheath of both fins little developed. Pectorals falcate, their length exceeding in adult that of head. Ventrals in young with the four outer rays gradually filiform, reaching anterior third of anal, in adult not reaching anal. Colour bluish above, silvery on sides and below, immature with five to seven transverse dark bands

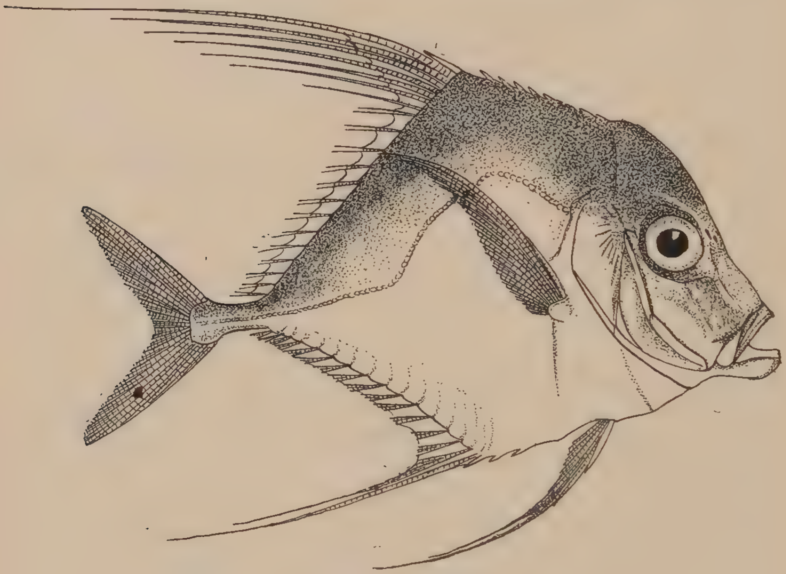

Fig. 53. *Alectis indica* (Rüpp.) $^5/_9$ nat. size.

on sides of body and root of caudal. Length up to 240 mm.

Nom. indig. Kuweh rombeh (Malay. Batavia).

Habitat: Sabang Bay!; Sumatra (Benkulen, Tiku, Padang); Java Sea; Java (Batavia); Bali; Celebes (Makassar Menado, Kema, Minahassa!); Banda!; Ambon!; Ceram; New Guinea. — Red Sea, Zanzibar, Natal, Agulhas Bank, False Bay, Madagascar, Muscat, Andamans, Bonin Islands, Japan, Formosa, Philippines, Australia, Solomon-, Pelew-, Kingsmill-, Hawaii-, Samoa-Islands, New Ireland, Tahiti.

2. **Alectis indica** (Rüpp.) [Fig. 53 p. 270].

Zeus gallus Bloch, Ausländ. Fische, VI. 1786. Taf. 192. — Bloch, Schneider, Syst. icht. 1801, p. 94 (nec. L. = *Argyreiosus vomer* (L.)).
Scyris indicus Rüppell, Atlas Fische Roth. Meer. 1828, p. 128.
Scyris indica Cuvier & Valenciennes, Hist. nat. Poiss. IX. 1833, p. 145.
Gallichthys major Cuvier & Valenciennes, l. c. p. 168.
Scyris indicus Rüppell, Neue Wirbelth., Fische, 1837, p. 51.
Gallichthys major Bleeker, Nat. & Geneesk. Arch. Ned. Ind. (3) II. 1845, p. 517.
Scyris indicus Cantor, Cat. Malay. Fish, Journ. Asiat. Soc. Bengal XVIII. 1850, p. 1116.
Gallichthys major Cantor, l. c. p. 1118.
Carangoides gallichthys Bleeker, Nat. Tijdschr. Ned. Ind. II. 1851, p. 471 (name only). — Makreel. Vissch. Verh. Batav. Gen. XXIV. 1852, p. 68.
Caranx gallus Günther, Cat. Brit. Mus. II. 1860, p. 455.
Carangoides gallus Bleeker, Versl. Akad. Amsterdam XII. 1861, p. 53 (name only).
Citula gallus Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 242 (name only).
Caranx gallus Klunzinger, Abh. zool. bot. Ges. Wien XXI. 1871, p. 454.
Caranx gallus Günther, Fische Südsee 1876, p. 135.
Caranx gallus Day, Fish. India 4° 1878—1888, p. 224.
Caranx gallus Macleay, Descr. Cat. Austral. Fish. I. 1881, p. 173.
Scyris gallus Klunzinger, Fische Roth. Meer. 1884, p. 101.
Blepharis gallus Sauvage, Poiss. Madagascar 1891, p. 518 (name only).
Scyris indica Fowler, Proc. Acad. Nat. Sc. Philadelphia LVII. 1905, p. 86.
Alectis ciliaris Jordan & Seale, Bull. Bur. Fish. XXVI. (1906) 1907, p. 14 (nec *Alectis ciliaris* Bloch).
Alectis major Jordan & Richardson, l. c. XXVII. (1907) 1908, p. 251.
Alectis indicus Bean & Weed, Proc. U. S. Nat. Mus. XLII. 1912, p. 600.
Alectis gallus M. Weber, Siboga-Exp. Fische 1913, p. 400.
Alectis indica Ogilby, Mem. Queensl. Mus. III. 1915, p. 83.
Alectis indica McCulloch, Check-list fish. N. S. Wales II. 1919, p. 52.
Scyris indica Fowler & Bean, Proc. U. S. Nat. Mus. LXII. 1922, p. 21.
Alectis indicus D. St. Jordan & E. K. Jordan, Mem. Carnegie Mus. X. 1922—25, p. 41
Alectis major Wakiya, Ann. Carnegie Mus. XV. 1924, p. 217.
Alectis gallus Hora, Mem. Asiat. Soc. Bengal. VI. 1924, p. 484.
Alectis indicus Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 550.
Scyris indica Fowler, Fish. Oceania, Mem. Bishop Mus. X. 1928, p. 151 [1]).

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[1]) The eggs and larvae of *Alectis indica* (Rüpp.). [*Caranx gallus* autt.] are described by Delsman, Treubia VIII. 1926, p. 214.

D.[1] VI (disappearing with age); D.[2] I 19; A. II (disappearing with age) I 16.

Strongly compressed, while young rhombic, angular and elevated, later somewhat more elongate, its depth 1.25 to nearly 2 in length. Head rather large, elevated 2.75—3.25 in length, its rostro-dorsal profile strongly ascending to dorsal fin, with an occipital gibbosity, the rostro-frontal profile steepest, with a concavity before eye. Eye small with rudimentary adipose eyelid, 3.5—4 in head. Height of praeorbital almost or quite twice diameter of eye. Snout somewhat pointed, gape of mouth oblique, chin prominent, maxillary reaching frontborder of eye or surpassing it slightly. Anterior part of lateral line curved, becoming straight below 10th dorsal ray, the straight part with more or less distinct keels, forming 8—12 weak scutes on caudal peduncle. Soft median fins with the majority of the rays of somewhat triangular form; their anterior part, in the dorsal the anterior seven or eight rays gradually elongated and with filiform termination; in the anal this is the case with the three or four anterior rays. Pectorals falciform, longer than the head. Ventrals in young with the two outer rays produced till caudal; in specimens of about 150 mm. the ventrals are normal and short. Colour silvery with a golden hue; five vertical bands in young. Length up to 600 mm. and said to attain, after Day, 1500 mm. [Specimen of BLEEKER's collection in the Amsterdam Museum seen by us].

Nom. indig.: Kuweh rombeh (Malay. Batavia), Djebus (Pasuruan, Banjuwangi, Java).

Habitat: Singapore; Riouw; Bintang; Banka; Sumatra (Benkulen, Padang, Priaman, Siboga); Sabang Bay!; Nias!; Java (Batavia); Bali; Borneo (Sungi duri); Celebes (Makassar!); Batjan; Banda!; Obi major; Ceram; Ambon!; Waigeu; New Guinea. — Red Sea, East coast Africa, Delagoa Bay, Madagascar, Mayotte, Muscat, British India, Siam, China, Formosa, Philippines, Australia (Queensland, N. S. Wales), Sandwich-, Society-, Hawaii Islands, New Ireland.

Doubtful or erroneously quoted species of Caranginae.

1. Trachurus trachurus L.

In the last of his many lists of fishes of Ambon (Ned. Tijdschr. Dierk. II. 1865, p. 289) *Caranx trachurus* is named as occurring on that island. No authority is quoted and there does not exist, as far as we know, an other statement about the occurrence of a species of *Trachurus* in the Archipelago.

2. **Caranx Novae Guineae** C. V.

Caranx Novae Guineae Cuvier & Valenciennes, Hist. Nat. Poiss. IX. 1833, p. 63.
Caranx Novae-Guineae Bleeker, Arch. Néerl. Sc. Nat. XIII. 1878, p. 50 (name only).
Caranx novae-guineae Jordan & Seale, Bull. Bur. Fish. XXV. (1905) 1906, p. 232 (name only).

The description of Cuvier's specimens from New Guinea of only 81 mm. length is too short to make it possible to decide what fish is meant.

3. **Caranx lepturus** Agassiz.

A. B. Meyer (Catálogo de los Peces recolectados en el archipiélago de las Indias orientales, Anal. Soc. Esp. Hist. Nat. XIV. 1885, p. 25) names this species as occurring at Macassar (Celebes). This is an error as *C. lepturus* Agass. is a species described from Brazil.

As New Guinea belongs to the region treated in the present work it is worth while to remark, that in the Fauna of Samoa by Jordan & Seale (Bull. Bur. Fish. XXV (1905) 1906, p. 232 the following species of *Caranx* are named as occurring in New Guinea, on the authority of Alleyne & Macleay, who described the fishes of the „Chevert" Expedition: an expedition which collected besides on other places also on the south coast of New Guinea. We presume that the last-named fact misled the american authors to suppose that the „Chevert" fishes were fishes from New Guinea. They quote therefore erroneously as coming from that island:

1. *Caranx bucculentus* All. & Macl. (Coast of Middle & South Queensland).
2. *Caranx platessa* C. V. (Percy-, Kermadec- Norfolk-Islands, Bass Strait, Japan).
3. *Caranx georgianus* C. V. (Australia, Norfolk-, Lord Howe Islands, Investigator Group).

2. Subfamily **Chorineminae.**

Compressed oblong, lanceolate or ovate; head compressed pointed, with a sharp occipital keel. Scales small, linear, arranged at different angles, more or less embedded in the skin, or lanceolate or rhombic; lateral line slightly arched or angulate anteriorly, otherwise straight without scutes; caudal peduncle slender, not keeled. Cleft of mouth moderate or wide. Jaws subequal; intermaxillary not protractile, except in the young, maxillary without supplemental bone. Teeth in jaws in youth in villiform bands, later larger ones in one or two series; in a patch on vomer, in a band on palatines and tongue, present also on pterygoids or not. Seven branchiostegals, branchial opening wide, gillmembranes free, not connected with isthmus. Gillrakers moderate. Pseudobranchiae present. Two dorsals: the first formed by III—V (*Oligoplites*) or VI–VII (*Chorinemus*) spines, preceded by a procumbent spine, more or less covered by skin; the other free with a basal membrane, getting rudimentary with age, the spines being more or less flattened, overlapping each other, or not reaching base of following spine when depressed. Second dorsal long with a spine and numerous rays, the anterior elevated, the posterior more or less disconnected and finlet-like, the interradial membrane more or less incomplete, getting more so with growth. Anal of about similar length and construction, preceded by two strong free spines. Pectorals short, not pointed; ventrals

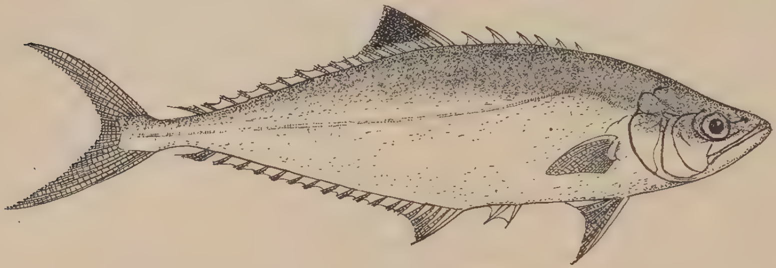

Fig. 54. *Chorinemus toloparah* (Rüpp.) $^1/_3$ nat. size.

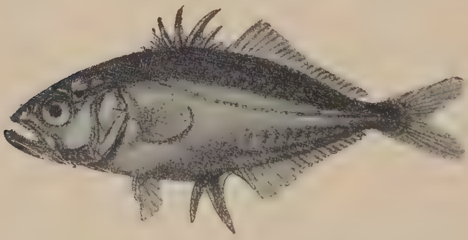

Fig. 55. *Chorinemus spec.* juv. from Surabaya. × 2. After Lütken. Differs from the full grown by the strong preopercular spines, by the strong and long dorsal and anal spines, the higher soft dorsal and anal with high membrane, reaching to the top of the rays.

short, depressible in a median groove. Caudal deeply incised, with equal lobes.

Distribution: An atlantic (*Oligoplites* Gill) and an indo-pacific (*Chorinemus* C. V.) genus, both living in tropical and subtropical water; some species reaching a large size; not much valued as food-fish.

1. **Chorinemus** Cuvier & Valenciennes.

(Cuvier & Valenciennes, Hist. nat. Poissons VIII. 1831, p. 367).
Scomberoides Lacépède Hist. nat. Poiss. II. 1800, pl. XX, fig. 3[1]).

Strongly compressed, oblong or ovate, dorsal and ventral profile about equally convex. Head naked, short, more or less equal to its height. Maxillary extending below eye or behind its hindborder. Scales small, needle-like, arranged at different angles or usually broadly lanceolate or rhombic; anterior part of lateral line slightly curved or angular, furtheron straight without scutes. Teeth in jaws in juvenile state in a villiform band of fine teeth, which dissappear lateron and are replaced in upper jaw by one or two series of larger teeth; in lower jaw by two regular series with a groove between them; the inner series is formed by conical, somewhat backward and inward curved teeth; the outer series may be of about equal size and number or they are larger and some near symphysis caniniform and directed outward. These mandibulary canines usually disappear first in specimens of about 150 mm; while

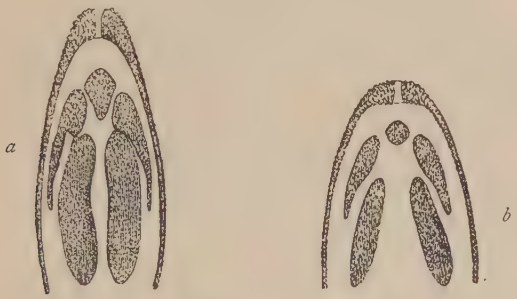

Fig. 56. Upper dentition *a* of *Chorinemus toloo-parah* (Rüpp.), *b* of *Ch. lysan* (Forsk.). After Lütken.

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[1] Barnard (Ann. S. Afric. Mus. XXI. 1925—27, p. 562) has alleged good reasons for rejecting the validity of the name *Scomberoides* Lac. recently generally in use.

similar intermaxillary canines are longer retained. Villiform teeth in an oval or rhombic patch on vomer, in a pyriform or somewhat hooked band on palatines, in a longitudinal band on pterygoids and tongue. According to age there may, therefore, be different grades of transition and mixing of teeth of juvenile and adult condition [1]). First dorsal with VI—VII spines, preceded by a procumbent spine; second dorsal with a spine and 19 to 21 rays; anal of a spine and 18 to 19 rays preceded by two strong distant spines; in both fins the posterior rays are detached or semidetached and penicillated.

Distribution: Large or moderate sized fishes of costal water of tropical or subtropical parts of the Indo-pacific.

Key to the indo-australian species of Chorinemus.

- I. Scales small but conspicuous, ovate or lanceolate.
  - A. Snout blunt, shorter than, in adult nearly equal to eye; maxillary surpassing hindborder of eye. Scales ovate or broadly lanceolate. Top of anterior elevated dorsal and anal rays without black blotches. A series of dark blotches along and above lateral line . . . . *Ch. lysan p.* 277.
  - B. Snout pointed, equal to eye or somewhat longer in adult. Maxillary reaching centrum or hindborder of eye. Scales more or less lanceolate, pointed.
    - 1. Body rather elongate, elliptical; its height more than four times in length; soft dorsal with a black blotch anteriorly.
      - *a.* Body higher than length of head; a series of dark blotches above lateral line. Scales rhombic, twice to two and a half longer than broad . . . . *Ch. tolooparah* p. 278.
      - *b.* Height of body and length of head nearly equal; a series of 6—8 dark blotches above, of 3—5 below lateral line; a darkblue band usually from occiput to pectoral. Scales lanceolate, pointed in their exposed part . . *Ch. sancti petri p.* 280.
    - 2. Body rather deep, nearly ovate, its height about 3.50 in length, much higher than length of head. Scales lanceolate. Vertical fins dusky without a black blotch . . . . *Ch. tala* p. 281.
- II. Scales needle-shaped or thread-like; snout pointed, equal to eye or slightly longer. Maxillary reaching centre of eye or hindborder of pupil . . . . *Ch. tol* p. 283.

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[1]) They gave rise to discrepancies in the diagnoses and induced to describe juvenile specimens as proper species (*Ch. tala* C. V.) or even as genera (*Eleria* Jordan & Seale).

1. **Chorinemus lysan** (Forsk.) [Fig. 56b p. 275].

Scomber lysan Forskål, Descr. anim. 1775, p. 12, 54.
Scombéroide commersonien Lacépède, Hist. nat. Poiss. II. 1800, pl. XX, fig 3.
Scomber Forsteri Bloch, Schneider, Syst. ichth. 1801, p. 26.
Scomber madagascariensis Shaw, General Zool. IV. 2, 1803, p. 85.
Lichia lysan Rüppell, Atl. Fische Roth. Meer. 1828, p. 91.
Scomber madagascariensis Bennett, Life of Raffles 1830, p. 689.
Chorinemus commersonianus Cuvier & Valenciennes, Hist. nat. Poiss. VIII. 1831, p. 370.
Chorinemus aculeatus Cuvier & Valenciennes, l. c. p. 384 (nec Bloch).
Chorinemus lyzan Cuvier & Valenciennes, l. c. p. 387.
? *Chorinemus farkharii* Cuvier & Valenciennes, l. c. p. 388.
Chorinemus lysan Rüppell, Neue Wirbelt. Fische 1835, p. 44.
Chorinemus forsteri Richardson, Ann. Mag. Nat. Hist. XI. 1843, p. 24.
Chorinemus aculeatus Bleeker, Journ. Ind. Archipelago, III. (1848) 1849, p. 67, 68. — Nat. Tijdschr. Ned. Ind. II. 1851. p. 213.
Chorinemus lysan Cantor, Journ. Asiat. Soc. Bengal XVIII. 1850, p. 1100.
Chorinemus Commersonianus Bleeker, Nat. Tijdschr. Ned. Indië III. (1851) 1852, p. 57. — Makreel. Vissch. Verh. Batav. Gen. XXIV. 1852, p. 44.
Chorinemus lysan Bleeker, Celebes, Act. Soc. Sc. Indo-neerl. VIII. 1860, p. 38.
Chorinemus lysan Günther, Cat. Brit. Mus. II. 1860, p. 471.
Chorinemus lysan Kner, Novara-Exp. Fische 1865—67, p. 163.
Chorinemus lysan Playfair & Günther, Fish. Zanzibar 1866, p. 63.
Chorinemus lysan Klunzinger, Abh. zool. botan. Ges. Wien XXI. 1871, p. 448. — Sitzb. Akad. Wien 1880, p. 378.
Chorinemus lysan Macleay, Descr. Cat. Austral. Fish. I. 1881, p. 178.
Chorinemus lysan Day, Fish. India 4°, 1878—1888, p. 231.
Chorinemus lysan Klunzinger, Fische Roth. Meer. 1884, p. 105.
Scomberoides lysan Jordan & Seale, Bull. Bur. Fish. 1906, p. 229.
Scomberoides lysan Seale, Philippine Journ. Sc. V. 1910, p. 272.
Chorinemus lysan M. Weber, Siboga-Exp. Fische 1913, p. 390.
Chorinemus lysan de Beaufort, Bijdr. Dierk. Leiden 1913, p. 132.
Chorinemus lysan Hora, Mem. Asiat. Soc. Bengal VI. 1924, p. 484.
Scomberoides lysan Wakiya, Ann. Carnegie Mus. XV. 1924, p. 238.
Scomberoides lysan Fowler, Proc. Acad. Nat. Sc. Philadelphia LXXVII. 1925, p. 213.
Chorinemus lysan Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 563.
Scomberoides lysan Fowler, Fish. Oceania, Bishop Mus. X 1928. p. 140.

D.^{1} (I procumbent) VI, D.^{2} I, 19—20; A. II, I 18.

Compressed, oblong, height about 3 in length; head 4.3–4.7, longer than high or as long as high, its rostro-frontal profile declivous in a straight line, somewhat concave in adult. Eye 4—5 in head, longer than, in adult about equal to obtuse snout. Jaws equal, the upper extending in young somewhat, in adult far behind eye. In upper jaw a series of enlarged conical teeth, followed by a band of villiform teeth, in lower jaw biserial teeth (see genus), usually a pair of symphysial oblique canines; villiform teeth in an ovate patch on vomer, in a pyriform band on palatines and a longitudinal band on pterygoids and tongue (see Fig. 56b). Scales roundish or ovate in young, broad lanceolate in adult, those of lower half less embedded; lateral line with a slight angular elevation soon after its commencement. Soft dorsal and anal anteriorly elevated, the height of the elevation in young twice, in adult less than twice lower than height of body; the last 8—10 rays semi-detached, finlet-like. Pectorals acute, 1.5 in length of head; ventrals acute, slightly longer; caudal forked with acute lobes. Colour silvery, bluish above, 6—8 dark roundish spots above and along lateral line; fins greyish without black blotches on anterior part of soft dorsal, anal and caudal lobes. Length up to 1000 mm.

Nom. indig.: Talang or Dawon bambu (Malay. Batavia); Badong (Javan. Samarang); Walegrin (Pasuruan); Lima djari (Ambon); Talang (Balikpapan).

Habitat: Penang; Malay Peninsula; Singapore; Banka; Sumatra (Telokbetong, Palembang); Java (Batavia); Madura; Borneo (Balikpapan!, Stagen!, Sampit, Kota Baru!, Sinkawang, Sandakan); Celebes (Makassar!), Saleyer!; Waigeu!; New Guinea. — Red Sea, Zanzibar, Beira!, Delagoa Bay, Chinde, Natal coast, Madagascar, Muscat, British India, Ceylon, Andamans, Siam, Formosa, Philippines, Torres Strait, Queensland, North West Australia.

2. **Chorinemus tolooparah** (Rüpp.) [Fig. 54, 56a p. 274, 275].

Lichia toloparah Rüppell, Atl. Fische Roth. Meer. 1928, p. 91.
Chorinemus mauritianus Cuvier & Valenciennes, Hist. nat. Poiss. VIII. 1831, p. 382 (juv. fide Sauvage).
Chorinemus toloo-parah Rüppell, Neue Wirbelt. 1835, p. 44.
? *Chorinemus mauritianus* Bleeker, Journ. Indian Arch. III. (1848) 1849, pp. 67, 68.
Chorinemus sancti petri Bleeker, Makreel. Vissch. Verh. Batav. Gen. XXIV. 1852 (nec C. V.) p. 45.
Chorinemus sancti petri Peters, Arch. Naturgesch. XXI. 1855, p. 245.
Chorinemus toloo Klunzinger, Abh. zool. botan. Ges. Wien XX. 1871, p. 447 (nec C.V.)
Chorinemus sancti Petri Günther, Fische Südsee 1876, p. 138 (nec syn.).
? *Chorinemus Sancti Petri* Day, Fish. India 4° 1878—88, p. 230 (nec C. V.).
Chorinemus Sancti-Petri Klunzinger, Sitzb. Akad. Wien 1880, p. 378.
Chorinemus moadetta Klunzinger, Fische Roth. Meer. 1884, p. 105 (nec C. V.).
Chorinemus sancti-petri Sauvage, Poiss. Madagascar, 1891, p 331 (p. p.).
Chorinemus toloparah Jordan & Evermann, Bull. U. S. Fish. Comm. XXIII. (1903) 1905, p. 180.

Scomberoides toloo-parah Jordan & Richardson, Bull. Bur. Fish. XXVI. (1906) 1907, p. 13.

Scomberoides toloo-parah Jordan & Richardson, l. c. 1908, p. 249.

Scomberoides toloo-parah Kendall & Goldsborough, Mem. Mus. Comp. Zool. Harv. Coll. XXVI. 1911, p. 267.

Chorinemus moadetta M. Weber, Siboga-Exp. Fische 1913, p. 390 (nec C. V.).

Scomberoides moadetta Wakiya, Ann. Carnegie Mus. XV. 1924, p. 235 (nec C. V.).

D.^{1} (I procumbent) VI, D.^{2} I 19—20; A. II, I 18—19.

Compressed, oblong-elongate, height moderately more than length of head, which goes 4.25—4.50 in length and has its rostro-nuchal profile slightly concave above eyes. Eye 4—4.50, in anterior part of head. Its diameter equal to or longer than pointed snout. Lower jaw sowewhat prominent; maxillary obliquely truncate, posteriorly extending to posterior third or almost hindmargin of eye. Cleft of mouth a little oblique, commences opposite middle of eye. Teeth in upper jaw in a short villiform band anteriorly, in a single or two series posteriorly, the outer of which has larger teeth which may be continued till near symphysis; in lower jaw in two series; on vomer in a rhombic patch with rounded angles, posteriorly more or less prolonged; in bands on palatines, pterygoids and tongue in young, the outer series has near upper and lower symphysis 1 or 2 caninelike teeth. Scales rather conspicuous, rhombic, pointed, in their exposed part somewhat excavated and more than twice longer than broad; lateral line anteriorly somewhat angulated becoming straight below anterior fourth of soft dorsal. Dorsal spines overlapping. Anterior dorsal rays elevated, the longest about twice in head, anal similar but slightly lower. Pectorals twice in head, ventrals somewhat shorter, reaching vent. Caudal deeply forked with equal lobes. Colour bluish above, silvery below, usually in adult a double series of dusky roundish blotches above and below lateral line, which may be transversely connected. Tips of dorsal and anal black. Length up to 300 mm.

Nom. indig.: Talang and Dawon bambu (Malay. Batavia); Walegring (Pasuruan, Java); Telang (Balikpapan).

Habitat: Singapore; Riouw Islands; Banka; Sumatra (Benkulen, Priaman); Simalur!, Nias!; Java (Batavia); Bali; Lombok!; Sumbawa!; Flores!; Borneo (Balikpapan!); Celebes (Makassar!, Bonthain, Badjoa, Menado, Kema); Lirung!; Halmaheira; Batjan; Ceram; Ambon!; Saparua; New Guinea. — Red Sea, Mossambique, Madagascar, Mauritius, Muscat, British India, Formosa, Philippines, Australia (Queensland), Marshall Islands, Fidji Islands, Hawaiian Islands, Samoa, Society Isl., Marquesas Isl., Gilbert Isl., Ellice Isl., Tonga Island.

3. **Chorinemus sancti petri** C. V.

Chorinemus sancti petri Cuvier & Valenciennes, Hist. Nat. Poiss. VIII. 1831, p. 379.
Chorinemus moadetta Cuvier & Valenciennes, l. c. p. 382.
Chorinemus sancti petri Günther, Cat. Brit. Mus. II. 1860, p. 473 (nec synon.).
Chorinemus Sancti Petri Klunzinger, Fische Roth. Meer. 1884, p. 106.
Chorinemus sancti petri Macleay, Proc. Linn. Soc. N. S. Wales IX. 1884, p. 24.
Chorinemus sancti petri Sauvage, Poiss. Madagascar 1891, p. 331.
Chorinemus sancti petri Steindachner, Denkschr. Akad. Wien LXX. 1900, p. 496.
Scomberoides sancti petri Jordan & Evermann, Bull. U. S. Fish. Comm. XXIII. (1903) 1905, p. 181.
Chorinemus sancti-petri Gillchrist & Thompson, Ann. S. Afric. Mus. VI. 1908, p. 186.
Scomberoides sancti petri Kendall & Goldsborough, 1911, p. 266.
Scomberoides sancti-petri McCulloch, Checklist fish. N. S. Wales, II. 1919, p. 54.
Scomberoides sancti petri Wakiya, Ann. Carnegie Mus. XV. 1924, p. 213.
? *Chorinemus sancti petri* Fowler, Proc. Acad. Nat. Sc. Philadelphia LXXVII. 1925, p. 234.
? *Chorinemus sancti-petri* Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 504.

D.[1] (I procumbent) VI, D.[2] I 20—21; A. II, I 18—19.

Lanceolate, compressed, rather slender, height about equal to length of head, which goes more than 4 to nearly 5 in length and has a slight depression above eyes. Eye 3.75 to more than 5, for the major part above longitudinal axis of body, nearly as long as pointed snout or a half diameter shorter. Jaws subequal; the maxillary truncate posteriorly, extending to below hindborder of eye. Teeth in upper jaw anteriorly in a villiform band posteriorly in a single row, in adult totally in a single row; in lower jaw somewhat larger, in two rows, near symphysis not caniniform in adult; villiform teeth in a patch on vomer, in bands on palatines, pterygoids and tongue. Scales lanceolate, pointed in their exposed part with a narrow peduncle; lateral line somewhat angular below spinous dorsal, thence straight. Dorsal spines flattened, overlapping when depressed, heteracanth, shorter than eye. Anterior rays of soft dorsal and anal elevated, the longest rays more than twice in head. Pectorals rounded, about twice in head, ventrals somewhat shorter; caudal deeply forked, lobes equal. Colour bluish above, silvery below, between head and anal 6—8 rather small dark blotches above lateral line, 3—5 below it; a dark blue oblique band from nape to pectoral; anterior part of soft dorsal with a black blotch, caudal dusky. Length 500 mm. and more.

Habitat: North coast Flores!. — Red Sea, Zanzibar, Mozambique, Natal coast, Delagao Bay, Madagascar, Formosa, Japan, Australia (N. S. Wales), Hawaiian Islands, Samoa, Fidji Islands.

Note: This species, distinguished by its slender, elongate body, is mentioned in numerous faunal lists, in some cases with a diagnosis or with diagnostic remarks; some of them we have quoted with a query, others we have neglected, as it was impossible to decide upon their taxonomic meaning. This is also the reason, that we can record it only from one place in the Archipelago, though we suppose, that it is wider distributed there.

4. **Chorinemus tala** (C. V.) Day.

Chorinemus tala Cuvier & Valenciennes, Hist. nat. Poiss. VIII. 1831, p. 377.
Chorinemus toloo Bleeker, Makreel. Vissch. Verh. Batav. Gen. XXIV. 1852, p. 45 (nec C. V.).
Chorinemus tala Günther, Cat. Brit. Mus. II. 1860, p. 473.
? *Chorinemus toloo* Günther, ibidem.
Chorinemus tala Day, Fish. India 4° 1878—88, p. 231.
Chorinemus toloo Day, l. c. p. 232 (nec C. V.).
Chorinemus toloo Macleay, Descr. Cat. Austral. Fish. I. 1881, p. 179 (nec C. V.).
Chorinemus toloo Klunzinger, Fische Roth. Meer. 1884, p. 104 (nec C. V.).
Chorinemus toloo Picaglia, Atti Soc. Modena (3) XIII. 1894, p. 30 (nec C. V.).
? *Scomberoides tala* Jenkins, Bull. U. S. Fish. Comm. XXII. (1902) 1904, p. 443.
Scomberoides toloo Fowler, Proc. Acad. Nat. Sc. Philadelphia, LVII. 1905, p. 56 (nec C. V.)
? *Eleria philippina* Jordan & Seale, Proc. U.S. Nat. Mus. XXVIII. 1905, p. 774 (juv.).
Scomberoides tala Jordan & Seale, Bull. Bur. Fish. XXVI. (1906) 1907, p. 13.
Eleria tala Jordan & Richardson, l. c. XXVII. (1907) 1908, p. 249.
Chorinemus tala M. Weber, Siboga-Exp. Fische, 1913, p. 391.
Scomberoides tala Jordan & Starks, Ann. Carnegie Mus. XI. 1917, p. 441.
Scomberoides tala Fowler, Proc. Acad. Nat. Sc. Philadelphia LXX. 1918, p. 14.
? *Scomberoides toloo* Waite, Rec. Austral. Mus. II. 1921, p. 101.
Chorinemus tala Hora, Mem. Asiat. Soc. Bengal VI. 1924, p. 484.

$D.^1$ (I procumbent) VII, $D.^2$ I 20; A. II, I 18.

Nearly ovate, height somewhat more than thrice in length, much more than length of head. Eye 4—4$^1/_2$ in head, in young longer than, lateron equal to or slightly shorter than obtuse snout. Maxillary extending in young to hindborder of eye, in adult somewhat surpassing it. Cleft of mouth opposite upper third of eye. Scales small but distinct, their exposed part lanceolate, lateral line angularly raised below anterior part of spinous dorsal, furtheron straight. Teeth in upper jaw in a single, in the lower in two series, the outer directed somewhat outwards, with two caniniform teeth on either side of symphysis. Villiform teeth in a triangular patch on vomer, in a longitudinal band on palatines, pterygoids and tongue. Elevation of anterior dorsal and anal rays equal to half height of body. Pectorals shorter than head, ventrals equal to head. Colour greyish above, silvery below; 4—8 vertically oblong dark blotches touching lateral line above or usually intersected by it. Vertical fins darkish, without black blotches anteriorly. Length 450 mm.

Habitat: Banka; Nias; Sumatra (Tandjong, Padang, Benkulen, Tiku, Trussan, Siboga); Java (Batavia); Celebes (Makassar, Badjoa, Menado); New Guinea. — Red Sea, Seychelles, British India, Ceylon, Andamans, Siam, Philippines, Australia, (Cape York, Queensland, Southern Australia), New Ireland, ? Hawaiian Islands.

Note: Day has described two species, one of which he thinks to be *Ch. tala* C. V., the other *toloo* C. V. Both species are so insufficiently described in the „Histoire naturelle des Poissons” that we are not able to recognise them. Rüppell (Neue Wirbelth. Fische 1835, p. 45) maintained, that his *toloparah* (Rüppell, 1828) was rebaptized by Cuvier (1831) in *toloo*. Comparing the descriptions of Day's two species we can find no other difference, than that in *tala* the anterior elevated dorsal rays are called black, while in *toloo* the soft dorsal is dusky. Both are distinguished by the height of their body which goes only about $3^1/_2$ times in total length and by the retention of a pair of intermaxillary and mandibulary canines (not mentioned by Cuvier & Valenciennes) which fact induced Jordan & Seale to create the genus *Eleria*, already quoted in our note on page 276. Bleeker gave the first useful diagnosis of what he called *Ch. toloo* C. V.; this diagnosis was amplified by Day. Since then *Ch. toloo* is repeatedly mentioned by different authors in faunal lists, sometimes with a few diagnostic remarks. But the name *toloo*, commonly in use, has to recede for *tala*, which has page-precedence by Cuvier & Valenciennes and also by Day.

5. **Chorinemus tol** C. V.

Chorinemus tol Cuvier & Valenciennes, Hist. Nat. Poiss. VIII. 1831, p. 385.
Chorinemus moadetta Rüppell, Neue Wirbelt. Fische 1835, p. 45 (nec C. V.).
Chorinemus tol Cantor, Journ. Asiat. Soc. Bengal XVIII. 1850, p. 1101.
Chorinemus tol Bleeker, Verh. Bat. Gen. XXIV. 1852, Makreel. Vissch. p. 43.
Chorinemus tol Kner, Novara-Exp. Fische 1865—67, p. 162.
Chorinemus moadetta Klunzinger, Abh. zool. bot. Ges. Wien XXI. 1871, p. 448 (nec C. V.).
Chorinemus moadetta Day, Fish. India 4°, 1878—88, p. 230 (nec C. V.)
Chorinemus tol Klunzinger, Fische Roth. Meer. 1884, p. 106.
Scomberoides moluccensis Fowler, Proc. Acad. Nat. Sc. Philadelphia LVII. 1905 p. 56.
Scomberoides (*Rhaphiolepis*) *tol* Fowler, l. c. p. 59.
Scomberoides tol Jordan & Richardson, Bull. Bur. Fish. 1908, p. 249.
Scomberoides tol Bean & Weed, Proc. U. S. Nat Mus. XLII. 1912, p. 601.
Chorinemus tol M. Weber, Siboga-Exp. Fische 1913, p. 390.
Scomberoides tol Fowler & Bean, Proc. U. S. Nat. Mus. LXII. 1922, p. 19.
Chorinemus tol Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 564.

D.^{1} (I procumbent) VII, D.^{2} I 19—21; A. II, I 18—20.

Compressed, oblong-elongate, height equal to or somewhat more than length of head, which goes about 4.5 in length, has a concave frontal profile and is longer than high. Dorsal profile of body rather more convex than the ventral. Eye 4.5 to more than 5 in head, somewhat less than pointed snout. Cleft of mouth commences opposite middle of eye; lower jaw somewhat longer, the upper extending to below centre of eye or hindmargin of pupil; maxillary expanded behind and somewhat truncate. Teeth in upper jaw with a small band of villiform teeth anteriorly and with an outer series of somewhat larger ones, the most anterior in young canine-like; lower jaw with two rows, the outer somewhat enlarged, the most anterior in young canine-like; vomer with an elongated oval patch; a longitudinal pyriform band on palatines, continued on pterygoids, present also on tongue. Scales linear, needle-like, giving the skin a striated or leather-like appearance; lateral line indistinct, almost straight, with a slight angular elevation above last third of pectoral. Anterior elevation of soft dorsal and anal moderate, that of the first more than twice in height of body, that of anal less. Pectorals somewhat shorter than head without snout; ventrals subequal. Caudal deeply forked, with long, acute lobes. Colour bluish above, silvery below, with a series of 5—8 oval or vertically oblong blackish or dusky blotches, the anterior of which intersected by the lateral line, the posterior lying above it; they may be indistinct; soft dorsal with a black tip. Length up to 500 mm.

Nom. indig.: Talang or Dawon bambu (Malay. Batav.).

Habitat: Penang Sea; Malay Peninsula; Singapore!; Banka; Nias; Sumatra (Tiku, Benkulen, Trussan, Padang, Priaman, Siboga, Singkel); Java (Batavia, Tandjong Priok!, Japara); Madura; Sumbawa; Celebes (Makassar!, Menado!); Ambon!; Batjan!. — Red Sea, Delagoa Bay, Natal coast, Madagascar, South Arabia, British India, Ceylon, Formosa, Philippines, Japan. In sea and mouth of rivers.

Doubtful species.

6. **Chorinemus orientalis** Temm. & Schl.

Chorinemus orientalis Temminck & Schlegel, Fauna Japon. Poiss. 1844, p. 106.
Scomberoides orientalis Wakiya, Ann. Carnegie Mus. XV. 1924, p. 237.

This species known from Japan and Formosa and the Riu Kiu Islands and recently recorded by Duncker & Mohr from New Pommern (Mittl. Zool. Mus. Hamburg XLIV. 1929, p. 80) is also mentioned in a faunal list by E. von Martens (Exp. nach Ost-Asien 1876, p. 391) from Batjan and by A. B. Meyer (Anal. Soc. Espan. Hist. Nat. XIV. 1885, p. 25) from North Celebes. Both records are without any taxonomic explanation.

3. Subfamily **Trachinotinae.**

Body strongly compressed, oblong or elevated, breast and belly rounded, not trenchant; nape more or less trenchant.

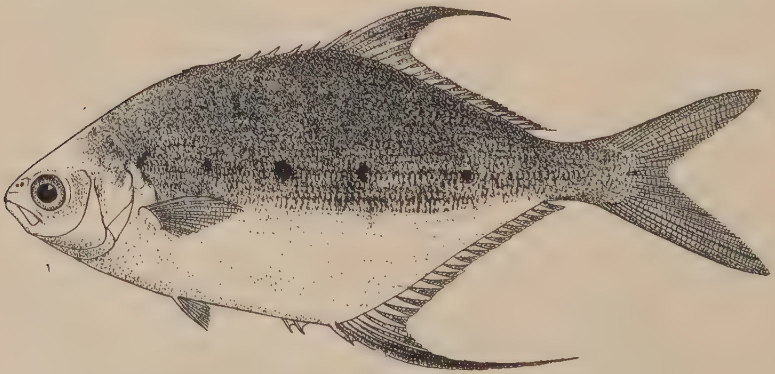

Fig. 57. *Trachinotus bailloni* Lac. × 2/5.

Scales small, adherant, cycloid, nearly wanting on head; lateral line nearly straight or slightly arched or undulous, without scutes, with sensory tubes or pores; caudal peduncle without any keel. Head small, with entire opercles, in young praeoperculum armed with spines; gillmembranes not united, free from isthmus; mouth rather small, with obtuse snout; intermaxillaries protractile; seven branchiostegals; no pseudobranchiae; gillrakers of normal shape. Small teeth in jaws, vomer and palatines, generally lost with age. Two dorsals, the first composed of an anterior procumbent spine and five or six erect spines, in youth well developed and connected by membrane, lateron the membrane disappears and in adult the free spines get rudimentary. Soft dorsal and anal of equal form and length, anteriorly highly falcate; no finlets; pectorals short, rounded; ventrals short; caudal deeply forked with long pointed lobes. The juvenile state with well developed teeth, normal spinous dorsal and moderate height of soft dorsal and anal is described as *Doliodon* Girard; the adult state with toothless mouth, not connected dorsal spines and produced caudal lobes as *Bothrolaemus* Holbrook.

Distribution: that of the single genus known.

1. **Trachinotus** Lacépède.

(Lacépède, Hist. nat. Poissons III. 1802, p. 79).
Caesiomorus Lacépède, l. c. p. 95.
Acanthinion Lacépède, l. c. iv. 1803, p. 500.

For characters see those of the subfamily.

Distribution: Pelagic fishes of moderate or large size, living in all tropical seas, extending also in temperate water.

Key to the indo-australian species of Trachinotus.

I. Height twice or less in length; commencement of cleft of mouth opposite below lower level of eye; body without spots . . . . *T. blochi* p. 286.
II. Height more than twice in length. Commencement of cleft of mouth opposite middle or lower third of eye; body with 2—6 lateral round spots.
  1. Two to five spots on lateral line; snout blunt; ventrals comparatively shorter. . . . . *T. bailloni* p. 288.
  2. Three to six spots above lateral line; snout pointed; ventrals comparatively longer. . . . . *T. russelli* p. 289.

1. **Trachinotus blochi** (Lac.)[1].

Scomber falcatus Forskål, Descr. animal. 1775, p. 57.

Trachinotus falcatus Lacépède, Hist. nat. Poiss. III. 1802, p. 79.

Caesiomorus blochii Lacépède, l. c. p. 95.

Centronotus ovalis Lacépède, l. c. p. 309, 316.

Trachinotus falcatus Rüppell, Atl. Fische Roth. Meer. 1828, p. 89.

Trachinotus mookalee Cuvier & Valenciennes, Hist. nat. Poiss. VIII. 1831, p. 423

Trachinotus blochii Cuvier & Valenciennes, l. c. p. 425.

Trachinotus affinis Cuvier & Valenciennes, l. c. p. 428.

Trachinotus falciger Cuvier & Valenciennes, ibid.

Trachinotus drepanis Cuvier & Valenciennes, l. c. p. 429.

Trachinotus falcatus Cuvier & Valenciennes, l. c. p. 430.

Trachinotus mookalee Bleeker, Nat. & Geneesk. Arch. Ned. Indië (3) II. 1845, p. 516 (name only).

Trachinotus affinis Bleeker, ibidem (name only).

Trachinotus auratus Richardson, Report Ichth. China & Japan in Rep. Brit. Assoc. (1845) 1846, p. 270.

Trachinotus mookalee Cantor, Journ. Asiat. Soc. Bengal, XVIII. 1850, p. 1102.

Trachinotus mookalee Bleeker, Nat. Tijdschr. Ned. Indië III. 1852, p. 412. — Makreel. Vissch. Verh. Batav. Gen. XXIV. 1852, p. 47.

Trachinotus ovatus Günther, Cat. Brit. Mus. II. 1860, p. 481 (nec *Gasterosteus ovatus* L.).

Trachinotus Blochii Bleeker, Versl. Akad. Amsterdam XII. 1861, p.p. 52, 74.

Trachynotus ovatus Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 242.

Trachynotus ovatus Kner, Novara-Exp. Fische, 1865—67, p. 164.

Trachynotus ovatus Klunzinger, Abh. Zool. botan. Ges. Wien. 1871, p. 449.

Trachynotus ovatus Günther, Fische Südsee 1876, p. 139.

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[1] The present species is generally known as *Trachinotus ovatus* (L.) since Günther (Cat. Brit. Mus. II. 1860, p. 481) associated it with *Gasterosteus ovatus* Linnaeus (Syst. nat. ed. X. 1758, p. 296). Lönnberg (Bih. Svenska Akad. XXII. 1890, N° I, p. 44), however, proved convincingly, that *Gasterosteus ovatus* L. is identical with what at present is generally called *Lichia glauca* L. auct., a species universally taken to be identical with *Scomber glaucus* L. But this is after Lönnberg a mistake. *Scomber glaucus* L. must have been a form with armed lateral line, probably a species of *Caranx*. This is evident from quotations made by Linné and cited by Lönnberg. *Lichia glauca* auct., must therefore be called *Lichia ovata* (L.) and Lönnberg concludes that the name *Trachinotus ovatus* L. as at present used, must be changed in *Trachinotus falcatus* (Forskål) as being the oldest name. This logical statement is invaliditated by the fact that Linnaeus described (Syst. nat. ed. X. 1758, p. 284) a *Labrus falcatus*, which was interpreted by Günther (Cat. Brit. Mus. IV. 1860, p. 87) as a *Lachnolaemus* and accordingly named *L. falcatus* (L.). This was an erroneus interpretation as the Linnean *falcatus* is a *Trachinotus* (see Jordan & Evermann, Fish. North. and Middle America 1896 and 1898 (p. 941 & 1580) called *Trachinotus falcatus* (L.). As the name *Tr. ovatus* (L.) cannot stand and the name *Tr. falcatus* (L.) is already occupied, the name *Tr. falcatus* (Forskål) cannot be used. It has to give way for the second oldest name *Trachinotus blochi* (Lacépède).

Trachynotus ovatus Day, Fish. India 4°, 1878—88 p. 234.
Trachynotus ovatus de Castelnau, Proc. Linn. Soc. N. S. Wales III. 1879, p. 383
Trachynotus ovatus Macleay, Descr. Cat. Austral. Fish. II. 1881, p. 180.
Trachynotus ovatus Macleay, Proc. Linn. Soc. N. S. Wales VII. 1882, p. 359.
Trachynotus ovatus Klunzinger, Fische Roth. Meer. 1884, p. 104.
Trachynotus ovatus Sauvage, Poiss. Madagascar, 1891, p. 332.
Trachinotus ovatus Jordan & Seale, Bull. Bur. Fish. XXV. (1905) 1906, p. 235.
Trachynotus ovatus Gilchrist & Thompson, Ann. South. Afric. Mus. VI. 1908, p. 187.
Trachinotus ovatus Ogilby, Mem. Queensl- Mus. v. 1916, p. 154.
Trachinotus ovatus McCulloch, Check-list fish. N. S. Wales 1919, p. 53.
Trachynotus ovatus Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 553.
Trachinotus ovatus Whitley, Rec. Austral. Mus. XVI. 1927, p. 16.
Trachinotus ovatus Fowler, Fish. Oceania, Bishop Mus. X. 1928, p. 151.

D.^{1} (I procumbent) V—VI, D.^{2} I 18—20; A. II, I 16—19.

Strongly compressed, ovate, elevated, dorsal profile generally convex but somewhat angular at the origin of the first and second dorsal; ventral contour similar but less so; height 1.75—2 in length; head small 3.5—4 in length, higher than long, its rostro-dorsal profile declivous in a straight line, but the snout swollen, its anterior profile slightly inclined backwards in immature state, getting vertical with age. Eye 3 to more than 4, its diameter little less than snout and much less than convex, elevated interorbital space, the nuchal keel behind which is rather moderate; adipose eyelid little developed. Cleft of mouth commences opposite below lower level of eye. Jaws nearly equal, the upper reaching to below front-border of eye. Teeth minute, disappearing with age. Scales small, increasing somewhat in size posteriorly, a few scales behind eye, head otherwise naked; lateral line gently curved, often slightly undulating. Dorsal spines rather strong, in youth connected by membrane which disappears later. Anterior rays of dorsal and anal produced, their length increasing with age, the dorsal finally reaching till caudal, the anal less far. Caudal forked with equal lobes. Pectorals less than head; ventrals longer than half length of pectorals. Colour uniform silvery, bluish above, fins yellowish-hyaline with the dorsal, anal and caudal lobes more or less blackish. Length up till 720 mm.

Nom. indig.: Kuweh (Malay. Batavia); Borung (Javan. Samarang); Lowang (Pasuruan).

Habitat: Penang Sea; Singapore; Banka; Biliton; Sumatra (Priaman, Pasuruan, Padang); Nias!; Java (Batavia); Borneo (Singkawang, Sampit); Celebes (North Celebes, Bulucomba); Ambon; Obi Major; New Guinea; Cocos Island. — Red Sea, Zanzibar, Chinde, Delagoa Bay, Coast of Natal, South Arabia, Seychelles, Madagascar, British India, Ceylon, Andamans, Malay Peninsula, China (Canton), Japan, Formosa, Cebu, Australia (Queensland, New South Wales, Raine Island, Darnley Island), New Pommern, Samoa, New Hebrides, Tonga Islands. — In sea.

2. **Trachinotus bailloni** Lac. [Fig. 57 p. 284].

Caesiomorus bailloni Lacépède, Hist. nat. Poiss. III. 1802, p. 93.
Caesiomorus quadripunctatus Rüppell, Atl. Fische Roth. Meer. 1828, p. 90.
Trachinotus Bailloni Cuvier & Valenciennes, Hist. nat. Poiss. VIII. 1831, p. 431.
Trachinotus quadripunctatus Cuvier & Valenciennes, l. c. p. 434.
Trachynotus quadripunctatus Cantor, Journ. Asiat. Soc. Bengal XVIII. 1850, p. 1104.
Trachinotus Bailloni Bleeker, Nat. Tijdschr. Ned. Indië III. 1852, p. 237. — Makreel. Vissch. Verh. Batav. Gen. XXIV. 1852, p. 46.
Trachinotus baillonii Günther, Cat. Brit. Mus. II. 1860, p. 484.
Trachinotus Baillonii Klunzinger, Abh. zool. bot. Ges. Wien XXI. 1871, p. 449.
Trachinotus bailloni Günther, Fische Südsee 1876, p. 139.
Trachinotus bailloni Day, Fish. India 4° 1878—88, p. 233.
Trachynotus baillonii Macleay, Descr. Cat. Austr. Fish. I. 1881, p. 180.
Trachynotus Baillonii Klunzinger, Fische Roth. Meer. 1884, p. 104.
Trachinotus baillonii Evermann & Seale, Bull. Bur. Fish. XXVI. (1906) 1907, p. 66.
Trachinotus baillonii Kendall & Goldsborough, Mem. Mus. Comp. Zool. Harvard Coll. XXVI. 1911, p. 271.
Trachinotus oblongus Kendall & Goldsborough, l. c. p. 272 (nec Cuvier & Valenciennes, fide Ogilby 1916).
Trachinotus bailloni Ogilby, Mem. Queensl. Mus. V. 1916, p. 149 (references and synonymy).
Trachinotus bailloni McCulloch, Check-list fish. N. S. Wales II. 1919, p. 53.
Trachynotus bailloni Wakiya, Ann. Carnegie Mus. XV. 1924. p. 219.
Trachynotus cuvieri Wakiya, l. c. p. 220.
Trachynotus quadripunctatus Wakiya, ibid.
Trachinotus baillonii Whitley, Rec. Austr. Mus. XVI. 1927, p. 16.
Trachinotus baillonii Fowler, Fish. Oceania, Bishop. Mus. X. 1928, p. 152.

D.^{1} (I procumbent) VI; D.^{2} I 22—24; A. II, I 22—24.

Oblong-ovate, strongly compressed, ventral profile somewhat more arched than dorsal, height 2.3—2,5; head small, 3.8 in length, its rostro-nuchal profile ascending in a nearly straight line, its nuchal keel slightly developed. Eye 3.5—4 in head, with the adipose eyelid rudimentary; its diameter slightly less than obtuse snout. Jaws equal, the upper terminating below frontborder of eye. Cleft of mouth opposite lower third of eye. Villiform teeth on jaws, vomer and palatines. Scales small, rounded, conspicuous; present on cheeks and temporal region, the head otherwise naked; lateral line rectilinear, slightly curved anteriorly, the sensory scales with a pore. Origin of soft dorsal about half length of head behind vent, anterior rays produced, the first the longest, extending in adult nearly to end of fin; anal similar but slightly higher. Pectorals shorter than head but longer than ventrals, which go 9 times or more in length of body; caudal with largely produced lobes. Colour greyish above, silvery white below, two to five rather small black spots in a series on lateral line; tips of median fins black. Length up to 500 mm. [Specimen of BLEEKER's collection in the Amsterdam Museum seen by us].

Nom. indig.: Kuweh (Malay. Batavia).

Habitat: Penang; Malayan Peninsula; Sabang Isl.!; Nias; Sumatra (Benkulen); Java (Batavia, Prigi); Bali; Celebes (Menado, Tombariri, Kema); Batjan; Ambon; Saparua; Ceram!; Obi major; New Guinea. — Torres Strait, Murray Island, Australia (Queensland, Percy Islands, Western Australia), Lord Howe Island, Red Sea, Zanzibar, Mauritius, Madagascar, Bourbon, Seychelles, Sokotra, South Arabia, Muscat, British India, Ceylon, Siam, Japan, Formosa, Riu Kiu Islands, Philippines, Society Islands, New Britain, New Hebrides, Samoa, Tahiti, Marquesas, Ellice Islands.

3. **Trachinotus russelli** C. V. [1]

Trachinotus russellii Cuvier & Valenciennes, Hist. nat. Poiss. VIII. 1831, p. 436.
Trachinotus oblongus Cuvier & Valenciennes, l. c. p. 437.
Trachinotus oblongus Bleeker, Nat. & Geneesk. Arch. Ned. Indië (3) II. 1845, p. 516 (name only). — Nalez. Bengal. Verh. Batav. Gen. XXV. 1853, p. 44 (name only).
Trachinotus Russellii Bleeker, Verh. Batav. Gen. XXV. 1853, p. 44 (name only).
Trachynotus oblongus Günther, Cat. Brit. Mus. II. 1860, p. 484.
Trachynotus russellii Day, Fish. India 4°. 1878—88, p. 233.
Trachynotus coppingeri Günther, Voy. „Alert" Zool. 1884, p. 29.
Trachynotus oblongus Boulenger, Proc. Zool. Soc. London 1887, p. 661.
Trachinotus russelli Jordan & Seale, Bull. Bur. Fish. XXV. (1905) 1906, p. 235.
Trachinotus velox Ogilby, Proc. Roy. Soc. Queensland XXI. 1908, p. 14.

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[1] Ogilby (l. i. c.) writes about the specific name: „We have found it necessary to reinstate Shaw's name *Scomber botla* for our fish in the place of the more commonly employed *T. russellii*, because both Shaw and Valenciennes founded their names on Russell's figure and there can be therefore no justification for rejecting the earlier name". We find the justification to reject Shaw's name in the fact, that it is impossible to recognize in his very insufficient diagnosis a *Trachinotus*; it describes the fish as covered with middle-sized scales and provided with ten to twelve finlets behind dorsal and anal. Shaw calls it allied to his *Scomber madagascariensis* = *Chorinemus lysan* (Forsk.). There must be some mistake in Shaw's quotation of „Botla Parak" of Russell's Indian Fishes.

Trachynotus oblongus Gilchrist & Thompson, Ann. S. Afric. Mus. VI. 1908, p. 187.
Trachinotus botla Ogilby, Mem. Queensl. Mus. III. 1915, p. 93 (nec *Scomber botla* Shaw, Gen. Zool. IV. 2, 1803, p. 591).
Trachynotus russellii Barnard, Ann. S. Afric. Mus. XXI. 1925—1927, p. 554
Trachinotus oblongus Fowler, Fish. Oceania, Bish. Mus. X. 1928, p. 152.
Trachinotus botla Fowler, ibidem (nec *Scomber botla* Shaw).
Trachynotus oblongus Duncker & Mohr, Mitt. Zool. Staatsinst. Hamburg XLIV. 1929, p. 80.

D.^{1} (I procumbent) VI, D.^{2} I 22—23; A. II, I 20—21 [1]).

Strongly compressed, ovate, dorsal and ventral profile nearly equally convex, height 2.25—2.75 in length; head pointed, 3.5—4 in length, its length and height equal, its dorsal profile slightly convex. Eye 3.5—4 in head, about equal to snout, pointed in young, blunter with age. Cleft of mouth commences opposite middle or lower third of eye; jaws about equal, the upper reaching to below centre of eye. Villiform teeth in jaws, still present in specimens of 500 mm.; in a patch on vomer, in a narrow band on palatines. Scales small, more conspicuous posteriorly, present on cheeks and temporal region; lateral line nearly straight. Soft dorsal and anal rays falcate anteriorly, the first reaching about $^3/_4$ of the length of the fin. Pectorals rounded, as long as head without snout; ventrals equalling in adult postorbital part of head, rather longer in the young; they go, according to age 7 to 11 times in body and reach nearly vent in adult, surpassing it in young. Caudal deeply forked, the acute lobes produced. Colour greenish on back, silvery or yellowish below; three to six more or less indistinct dull round patches, mostly above the lateral line, they often disappear after death; lobes of dorsal, anal and caudal blackish. Length up to 560 mm. [Not seen by us].

Habitat: Java (Batavia); New Guinea. — Natal coast, Madagascar, Muscat, British India, Formosa, Australia (Moreton Bay, Western Australia), Bernier Island, Lord Howe Island, New Pommern.

4. Subfamily **Seriolinae.**

Long and slender or oblong, slightly compressed, with rounded abdomen, head without trenchant occipital keel. Scales small, cycloid, lateral line without scutes, anteriorly a little

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1) In *Tr. velox* Ogilby the number of dorsal rays is 25, of anal rays 26. Ogilby thinks, nevertheless, that *Tr. velox* should be reduced to a synonym of *Tr. botla* = *russelli.*

curved, on caudal peduncle with a more or less distinct cutaneous keel. Cleft of mouth small or wide, terminal; intermaxillaries protractile. Seven branchiostegals, gillmembranes not connected, free from isthmus. Gillrakers in moderate or small number, usually of normal size. Praeoperculum and operculum in adult entire. Teeth in villiform bands in jaws, vomer, palatines and usually on tongue. Two dorsals; the first with VI to VII spines, (in youth connected by membrane), which may be depressible into a groove and have inclination to loose their membrane, becoming weak and obsolete and may be reduced in number or partly buried in the skin. Soft dorsal with somewhat elevated but not falcate anterior rays. Anal similar but much shorter, somewhat more or less than half length of soft dorsal, preceded by two weak spines, which may become obsolete in adult. Dorsal and anal with or without finlets. Caudal deeply incised. Pectorals short, not falcate; ventrals inserted behind base of pectorals and usually longer than pectorals.

Distribution: Inhabitants of tropical and subtropical seas; costal or pelagic fishes, some attaining large size and valued as food-fishes.

Key to the indo-australian genera of Seriolinae.

I. A two-rayed finlet behind dorsal and anal . . . . . 1. *Elagatis* p. 291.
II. No finlets behind dorsal and anal.
  a. Dorsal spines in adult connected by membrane, five to seven in number . . . . 2. *Seriola* p. 294.
  b. Dorsal spines in adult totally free and reduced to four or five. . . . . 3. *Naucrates* p. 298.

1. Elagatis Bennett.

(Bennett, Narrative of a Whaling Voyage II, 1835, p. 283).
Seriolichthys Bleeker, Nat. Tijdschr. Ned. Indië VI. 1854, p. 196.

Long and slender, slightly compressed, with rounded abdomen; head long, pointed with slight occipital keel; terminal, rather small mouth; intermaxillary protractile, maxillary posteriorly triangular with an elongate supplemental bone, slipping for the most part inside praeorbital; praeoperculum and operculum entire. Seven branchiostegals, gillmembranes not connected, free from isthmus, gillopening wide, extending forward till below eye. Gillrakers in moderate number. Villiform teeth in jaws, on vomer and palatines, none on tongue.

Scales partly small, cycloid; somewhat larger ones with the hindmargin truncate or rounded and slightly denticulate, surrounded by smaller cycloid ones; on head more lanceolate scales on cheeks, postorbital region, laterally on vertex and on top of operculum, head otherwise naked. Lateral line slightly curved, becoming straight above origin of anal, thence continued to base of caudal; scutes or a caudal keel, at least a prominent one, are wanting. First dorsal with six rather low, connected spines, depressible into a groove. Second dorsal and anal long, anteriorly somewhat elevated, with a basal scaly sheath, both posteriorly with a distant two-rayed finlet. Two free small anal spines visible or covered by skin. Caudal deeply incised, the lobes acute. Pectorals short and broad; ventrals inserted somewhat behind base of pectorals, superficially depressible into an undeep median groove.

Distribution: The two species known are pelagic fishes of large size, inhabiting by preference the open tropical oceans; one distributed circumtropically with exception of the Eastern Pacific, the other restricted to the Indic.

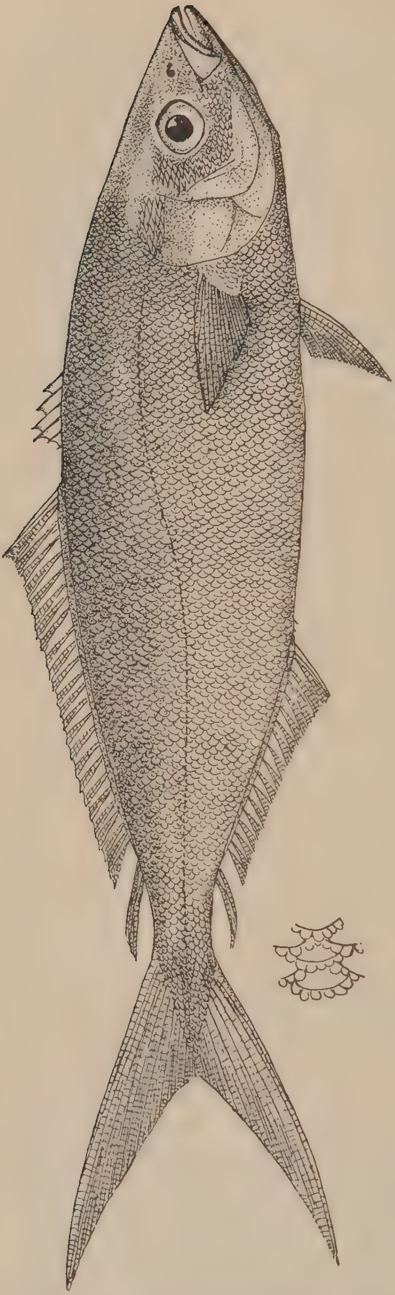

Fig. 58. *Elagatis bipinnulatus* (Q. G.) ca. $^{1}/_{3}$ nat. size and a few larger scales, posteriorly surrounded by smaller ones.

1. **Elagatis bipinnulatus** (Q. G.) [Fig. 58 p. 292].

Seriola bipinnulata Quoy & Gaimard, Voy. Uranie et Physic. I. 1824, p. 363.
Elagatis bipinnulatus Bennett, Whaling Voy. II. 1840, p. 283.
Seriolichthys bipinnulatus Bleeker, Nat. Tijdschr. Ned. Indië VI. 1854, p. 196.
Seriolichthys bipinnulatus Günther, Cat. Brit. Mus. II. 1860, p. 468.
Seriolichthys lineolatus Day, Proc. Zool. Soc. London 1867, p. 559.
Seriolichthys bipinnulatus Klunzinger, Abh. zool. bot. Ges. Wien XXI. 1871, p. 452.
Seriolichthys bipinnulatus Günther, Fische Südsee, 1876, p. 136.
Seriolichthys bipinnulatus Day, Fish. India 4°, 1878—88. p. 228.
Seriolichthys bipinnulatus Klunzinger, Fische Roth. Meer. 1884, p. 103.
Seriolichthys bipinnulatus Carus, Prodr. Faunae Medit. II. 1889—1893, p. 673.
Elagatis bipinnulatus Meek & Bollman, Proc. Acad. Nat. Sc. Philadelphia (1889) 1890, p. 42.
Elagatis bipinnulatus Jordan & Evermann, Fish. North & Middle America I. 1896, p. 906.
Elagatis bipinnulatus Jordan & Evermann, Bull. U. S. Fish. Comm. XXIII. (1903) 1905, p. 185.
Elagatis bipinnulatus Fowler, Proc. Acad. Nat. Sc. Philadelphia LVII. 1905, p. 65.
Elagatis bipinnulatus Stead, Add. Fish. Fauna N. S. Wales, 1907, p. 17.
Elagatis bipinnulatus M. Weber, Siboga-Exp. Fische 1913, p. 393.
Elagatis bipinnulatus McCulloch, Check-list fish. N. S. Wales II. 1919, p. 53.
Elagatis bipinnulatus Wakiya, Ann. Carnegie Mus. XV. 1924, p. 233.
Elagatis bipinnulatus Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 562.
Elagatis bipinnulatus Marshall, Mem. Queensl. Mus. IX. 1928, p. 190.
Elagatis bipinnulatus Fowler, Fish. Oceania, Bishop Mus. X. 1928, p. 143.

D.^{1} VI, D.^{2} I 24—27+2; A. II, I 15—17+2.

The proportions of head and body differ greatly with growth; height according to age 3 to more than 5 in length; head 3.5 to more than 4, much longer than high, subconic, pointed, its rostro-occipital profile nearly straight. Eye small, with a narrow adipose eyelid; according to age 5.5 to more than 7 in head, about twice more than convex interorbital space, in young slightly shorter than pointed snout; the snout prolonged with growth and finally about thrice longer than diameter of eye. Maxillary reaches in young almost to frontborder of eye, later about halfway between nostril and eye. Lateral line with more or less than 100 unarmed scales with sensory tubules. Dorsal spines about 6 or 7 times in height of body, anterior part of soft dorsal two and half times in that height; elevated part of anal somewhat lower. Pectorals about half length of head, equal to ventrals. For other characters see those of the genus. Colour greenish above, white or silvery below; a narrow longitudinal blue band from orbit to tail, an other from point of snout running below eye to tail; between both a yellow band in life; fins greyish or yellowish, caudal with a darker margin. Length up to 1110 mm.

Habitat: Sumatra (Padang); Java (Batavia); Cocos Isl.; Celebes (Makassar, Menado); Ambon; Banda!; New Guinea. — Red Sea, Zanzibar, Natal coast, Madagascar, Mauritius, Seychelles, Muscat, British India, Japan, Australia (South Queensland, N. S. Wales), Solomons, Carolines, New Britain, Hawaii, Society Islands.

2. **Seriola** Cuvier.

(Cuvier, Règne Animal, édit. 2. II. 1829, p. 218).

Zonichthys Swainson, Nat. Hist. Fishes etc. II. 1839, p. 248.
Halatractus Gill, Proc. Acad. Nat. Sc. Philadelphia 1862, p. 442.
Seriolina Wakiya, Ann. Carnegie Mus. XV. 1924, p. 230.

Oblong to long and slender, somewhat compressed, abdomen usually rounded; head conical, with pointed snout (*Halatractus*, *Seriola* s. str.) or strongly curved with blunt, nearly vertical snout (*Zonichthys*). Gape of mouth usually wide; the intermaxillaries protractile, the maxillary with a large supplemental bone, reaching frontborder or middle of eye. Seven branchiostegals, gillopening wide, reaching to below mandibles, gillmembranes not connected, free from isthmus. Praeoperculum entire, denticulated only in youth. Scales small; lateral line slightly arched above pectorals, without scutes, on caudal peduncle with a cutaneous keel. Teeth in villiform bands on jaws; similar teeth on vomer, palatines and tongue. Gillrakers moderate in number and of normal shape, or transformed in rudimentary tubercle-like masses (*Seriolina*)[1]. First dorsal with

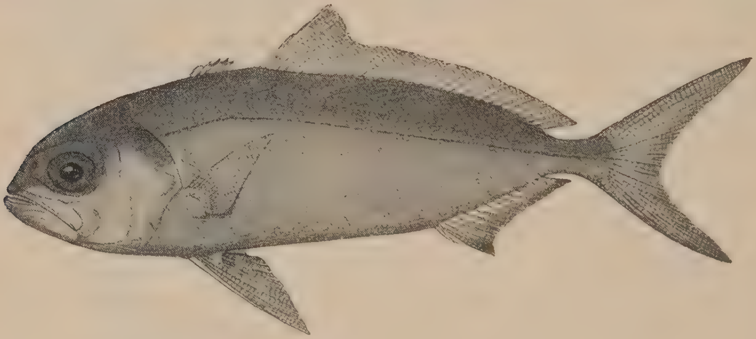

Fig. 59. *Seriola nigrofasciata* (Rüpp.) × 4/7 nat. size.

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[1] Can this be the influence of age or of mutilation by Cymothoids?

VII weak spines, preceded by a procumbent more or less obsolete spine; the last spine may become obsolete or buried in the skin; the spines are connected by membrane; soft dorsal and anal elevated in front, the anal much shorter than dorsal, preceded by two weak spines, becoming obsolete with age. No finlets. Caudal deeply incised. Pectorals shorter than head, rather broad; ventrals longer, connected by a double fold with the abdominal skin. Some of the proportions, especially the height, change conspicuously with age, in some species also the colouration of young and old; the young being banded.

Distribution: Inhabiting the costal and deeper water of all tropical and subtropical seas; some species attain a large size and are valued as food-fish.

Key to the indo-australian species of Seriola.

1. Rostro-dorsal profile of head strongly convex, the snout nearly vertical, equal to eye or nearly so. Gillrakers 8—9, short . . . . 1. *S. nigrofasciata* p. 295.
2. Rostro-dorsal profile of head somewhat convex, the snout almost pointed, twice longer than eye. Gillrakers about 15, of normal size and shape . 2. *S. dumerili* p. 297.

1. Seriola nigrofasciata (Rüpp.) [Fig. 59 p. 294].

Nomeus nigrofasciatus Rüppell, Atl. Reise N. Afrika 1826—1831, p. 28.
Seriola binotata Cuvier & Valenciennes, Hist. nat. Poiss. IX. 1833, p. 215.
Seriola Ruppelii Cuvier & Valenciennes, l. c. p. 216.
Seriola nigrofasciata Rüppell, Neue Wirbelth. Fische Roth. Meer. 1835, p. 51.
Seriola intermedia Temminck & Schlegel, Fauna Japon. Poiss. 1844, p. 116.
Seriola nigrofasciata Bleeker, Nat. & Geneesk. Arch. Ned. Indië (3) II. 1845, p. 518 (name only).
Seriola binotata Cantor, Journ. Asiat. Soc. Bengal XVIII. 1850, p. 1119.
Seriola binotata Bleeker, Nat. Tijdschr. Ned. Ind. III. (1851) 1852, p. 57.
Seriola Rüppelii Bleeker, Makreel. Vissch. Verh. Batav. Gen. XXIV. 1852, p. 73.
Micropteryx nigrofasciata Rüppell, Samml. d. Senckenberg. Mus. 1852, p. 12.
Seriola nigrofasciata Günther, Cat. Brit. Mus. II. 1860, p. 465.
Seriola nigro-fasciata Playfair & Günther, Fish. Zanzibar, 1866, p. 62.
Seriola nigrofasciata Klunzinger, Abh. zool. botan. Ges. Wien XXI. 1871, p. 450.
Seriola intermedia Bleeker, Japon, Verh. Akad. Amsterdam XVIII. 1879, p. 14 (name only).
Seriola nigrofasciata Macleay, Descr. Cat. Austral. Fish. I. 1881, p. 174.
Seriola nigrofasciata Klunzinger, Fische Roth. Meer. 1884, p. 103.
Seriola nigrofasciata Day, Fish. India 4°, 1878—88, p. 227.
Seriola nigrofasciata Evermann & Seale, Bull. Bur. Fish. XXVI. 1906, p. 63.
Seriolina intermedia Wakiya, Ann. Carnegie Mus. XV. 1924, p. 230.
Zonichthys nigrofasciata Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 557
Seriola nigrofasciata Fowler, Fish. Oceania, Bishop Mus. X. 1928, p. 142.

D.^{1} (I procumbent) V–VII, D.^{2} I 31–34; A. O. (I–II), I 15–17. Oblong, somewhat compressed, with rounded abdomen, height 2.75 to more than 3 in length, diminishing relatively with age, as also some other proportions change. Head in young equal to height of body, in adult conspicuously less till about 3.50 in length; as high as long, its rostro-dorsal profile strongly convex, the snout nearly vertical. Eye 4—4.50 in young, somewhat shorter in old, equal to snout. Maxillary posteriorly broadened, about equal to half diameter of eye, extending to posterior third of eye. Praeorbital anteriorly and posteriorly of about equal height, which equals almost that of hindborder of maxillary. Gillrakers 8—9, on lower part of first branchial arch, short, which may get knob-like and rudimentary. Bands of villiform teeth in jaws; equally broad anteriorly. Similar teeth in a pyriform patch on vomer, in a band on palatines, in changing distribution on tongue. Scales minute, rudimentary, more conspicuous on posterior part of body; lateral line slightly arched anteriorly; without scutes, in old specimens with a low keel on caudal peduncle. Spinous dorsal short and low, twice its own length distant from soft dorsal, the anterior rays of which are elevated but not falcate. Anal of similar form but shorter and lower, its two preceding spines very small, one or both obsolete in adult. Pectorals pointed, about two third of length of head. Ventrals with an outward and inward membrane connected with the abdominal skin; longer than pectorals; in young equal to head and nearly reaching vent; in adult not so far and shorter than head. Caudal incised, with convex acute lobes. Colour bluish above, yellowish-white below; the young with 5—7 dark crossbars, one below spinous dorsal, which fin is black; the following three entering soft dorsal, they have an anterior direction above, a somewhat posterior direction below lateral line; soft dorsal dusky with the elevated portion black with a white tip; ventral and anal black; caudal yellow, the lobes dark in young. Length up to 700 mm. [Specimen of BLEEKER's collection in the Amsterdam Museum seen by us].

Habitat: Penang Sea; Singapore; Java (Batavia); Celebes (Makassar); Ambon. — Zanzibar, Natal coast, Madagascar, British India, Ceylon, China, Philippines, Japan, Australia (Port Jackson), Louisiades. — Living in deeper water in sea.

2. Seriola dumerili Risso.

Caranx dumerilii Risso, Ichthyol. Nice, 1810. p. 175.
Seriola dumerilii Risso, Hist. Nat. Eur. Mérid. III. 1826, p. 424.
Seriola dumerilii Cuvier & Valenciennes, Hist. nat. Poiss. IX. 1833, p. 201.
Seriola purpurascens Temminck & Schlegel, Fauna Jap. Poiss. 1844, p. 113.
Seriola tapeinometopon Bleeker, Nat. Tijdschr. Ned. Ind. V. 1853, p. 80 (juv.).
Seriola purpurascens Bleeker, Verh. Bat. Gen. XXVI. 1854—57, Nalez. Japan, p. 103.
Seriola dumerilii Günther, Cat. Brit. Mus. II. 1860, p. 462.
Seriola dumerili Kner, Novara-Exp. Fische 1865—67, p. 161.
Seriola aureo-vittata Klunzinger, Abh. zool. bot. Ges. Wien. XXI. 1871, p. 450.
Seriola dumerilii Günther, Fische Südsee II. 1876, p. 136.
Seriola dumerili Day, Fish. India 4° 1878—88, p. 228.
Seriola Dumerilii Carus, Prodr. Faunae Medit. II. 1889—93, p. 672.
Seriola tapeinometopon Carus, ibidem.
Seriola cretata Fowler, Journ. Acad. Nat. Sc. Philadelphia (2) XII, 1904, p. 506.
Seriola purpurascens Jordan & Evermann, Bull. U. S. Fish. Comm. XXIII. (1903) 1905, p. 183.
Seriola purpurascens Wakiya, Ann. Carnegie Mus. XV. 1924, p. 228.
Seriola purpurascens Fowler, Fish. Oceania, Bishop Mus. X. 1928, p. 141.
Seriola tapeinometopon Fowler, l. c. p. 142.

D.^{1} VII (VI), D.^{2} I 32—33; A. II, I 19—22.

Long and slender, somewhat compressed, height 3 to 4 in length, head 3.2 to 3.75, pointed, the rostro-nuchal profile somewhat convex. Eye 5 to more than 6 in head; situated in middle of head and above longitudinal axis of body, about twice in length of somewhat pointed snout, and about twice in strongly convex interorbital space. Maxillary enlarged posteriorly by a broad supplemental bone and equalling eye in width, extending almost to middle of eye. Gillrakers more or less than 15 on lower branch of first branchial arch, their length about three fourth of diameter of eye. Scales small, cycloid, about 170—180 in lateral line, which is nearly straight with a slight curvature over pectorals; cheeks scaly, head otherwise naked. Teeth in villiform bands in jaws, the intermaxillary band anteriorly broader than the mandibulary; similar teeth in a patch on vomer, in bands on palatines and tongue. Spinous dorsal commencing somewhat behind base of pectorals; the spines connected by membrane, weak, the highest surpassing length of eye, folding in a groove; the last one very short, becoming buried in the skin. Anterior dorsal rays not much elevated, about 2.5 in head; anal originating a little before middle of soft dorsal, its anterior rays shorter than those of dorsal, the preceding spines very short, not plainly visible in adult; both fins with a scaly basal sheath. Caudal widely forked with curved pointed lobes; short caudal peduncle with a distinct cutaneous keel. Pectorals shorter than snout and eye, rounded inferiorly, ventrals somewhat longer, their origin below posterior part of base of pectorals. Colour brownish above with a blue hue, whitish below, in life with a yellow band through eye to caudal, fins dusky white. Very young specimens have 5—6 dark crossbands (*tapeinometopon* Blkr.). Length up to over 1000 mm.

Habitat: In case the indo-pacific *S. purpurascens* T. & Schl. is united with the atlantic *S. dumerili* C. V. the distribution is an universal one in all tropical and subtropical seas; when separated *S. purpurascens* is known from: Flores, Solor, Ambon, New Guinea. — Red Sea, South Arabia, Muscat, British India, China, Japan, Philippines, Hawaiian Islands.

Note: Wakiya (l. s. c.), the latest author, admits that *S. purpurascens* closely resembles *S. dumerili*, „but differs from it in the proportion of the maxillary in the head, the position of the spinous dorsal in reference to the base of the pectoral and the coloration of the body". About the position of the spinous dorsal Günther says, that he found the position of this fin exactly the same in Mediterranean specimens as in Chinese. As to the proportion of the maxillary in head, Wakiya finds it in Japanese specimens of 285 and 600 mm. length 2.27 and 2.45; Jordan & Evermann in Hawaiian specimens of 200 and 775 mm. length 2.3 and 2.4. Jordan & Evermann (Fish. N. & Middle America 1896, p. 903) mention as length $2^1/_{10}$ in head for an atlantic specimen of 600 mm. — Both the mediterranean and the indo-pacific have the same juvenile colouration (*tapeinometopon* Blkr.). Lütken (Spolia Atlantica 1880, p. 528), Klunzinger, Boulenger agree with Günther in pleading for the identity of *purpurascens* and *dumerili*.

3. **Naucrates** Rafinesque.

(Rafinesque Carrat. Nuovi Gen. 1810. p. 44).

Elongate, slightly compressed; head convex with blunt, rounded snout and terminal, oblique, small mouth; the maxillary scarcely reaching orbit. Scales small; lateral line without scutes, with a caudal cutaneous keel in adult. Seven branchiostegals, gillmembranes not connected, free from isthmus. Teeth in villiform bands in jaws, vomer and palatines, tongue rough. Gillrakers moderate, normal. Spinous dorsal in young with normally IV, occasionally V or VI connected spines, in adult reduced to 4 weak free spines; soft dorsal with a spine and 26—28 rays, the anterior slightly elevated; anal much shorter, with a spine and 16—17 rays, the 2 praeanal spines becoming

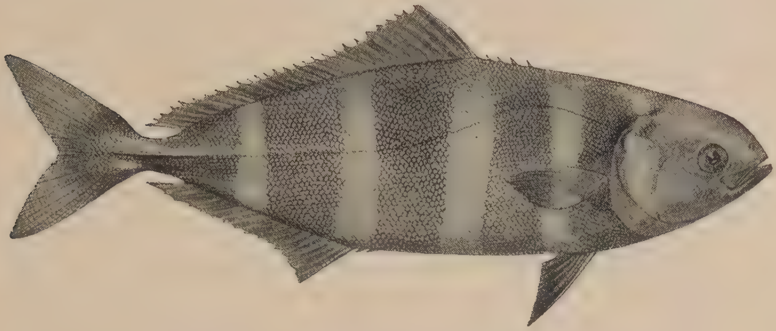

Fig. 60. *Naucrates ductor* (L.) × 1/3 nat. size.

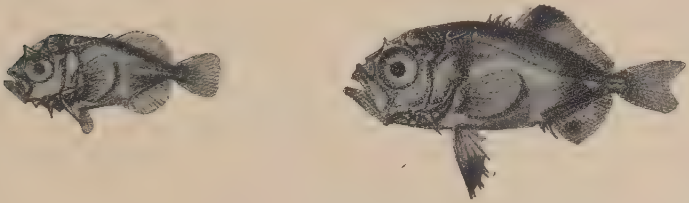

Fig. 61. Two first stages of the *metamorphosis* of *Naucrates ductor* (L.), known as *Xystophorus* Richardson × 3. After Lütken.

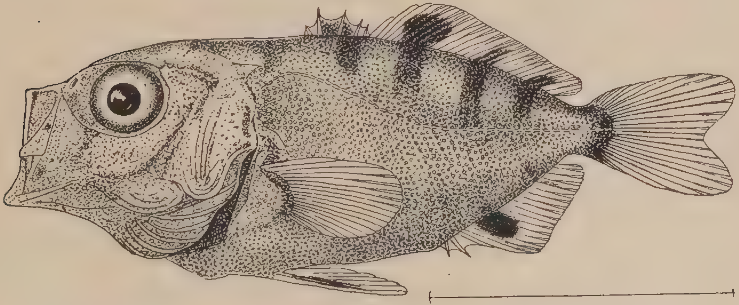

Fig. 62. Second or *Nauclerus* C. V.—stage of *Naucrates ductor* (L.) × 4. After M. Weber.

obsolete in adult. No finlets behind both fins. Pectorals short, ventrals inserted behind base of pectorals. Caudal deeply incised. *Naucrates* passes through a complicated metamorphosis, first understood by Lütken; the first larval stage is known as *Xystophorus* Richardson, the second as *Nauclerus* C. &. V. with crests and large spines on the supraorbital, praeoperculum and suprascapulare, getting obsolete with growth; the spinous dorsal is perfect and connected with the soft dorsal; the colouration is quite different.

Distribution: A single pelagic species in all tropical and subtropical seas; the larvae and young ones find shelter between the tentacles and branches of medusae and Siphonophores, together with other *Carangidae*[1]).

1. **Naucrates ductor** (L.) [Fig. 60, 61, 62 p. 299].

Gasterosteus ductor Linnaeus, Syst. nat. ed. X. 1758, p. 295.
Gasterosteus antecessor Daldorf, Skriv. Nat. Selskab. Kjøb. II. 1800, p. 166.
Scomber koelreuteri Bloch & Schneider, Syst. Ichth. 1801, p. 570.
Centronotus conductor Lacépède, Hist. Nat. Poiss. III. 1802, p. 311.
Naucrates fanfarus Rafinesque, Caratteri 1810, p. 45.
Naucrates indicus Lesson, Voy. Coquille, 1829, p. 157.
Naucrates noveboracensis Cuvier & Valenciennes, Hist. Nat. Poiss. VIII. 1831, p. 325.
Seriola dussumieri Cuvier & Valenciennes, l. c. IX. 1833, p. 217 (juv.).
Seriola succincta Cuvier & Valenciennes, l. c. p. 218 (juv.).
Nauclerus compressus Cuvier & Valenciennes, l. c. p. 249.
Nauclerus abbreviatus Cuvier & Valenciennes, l. c. p. 251.
Nauclerus brachycentrus Cuvier & Valenciennes, l. c. p. 253.
Nauclerus triacanthus Cuvier & Valenciennes, ibid.
Nauclerus annularis Cuvier & Valenciennes, l. c. p. 254.
Nauclerus leucurus Cuvier & Valenciennes, l. c. p. 255.
Naucrates cyanophrys Swainson, Nat. Hist. Fishes II. 1839, p. 412.
Naucrates serratus Swainson, l. c. p. 413.
Xystophorus Richardson, Voy. Erebus and Terror, 1844. p. 52.
Naucrates indicus Bleeker, Verh. Batav. Gen. XXV. 1853, Nalez. Bengalen, p. 42.

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1) A remarkable experience of the Siboga Expedition about the biological attachment of *Naucrates* with the sharks was described by one of us as follows: „Au voisinage de Kabaëna, comme nous avions pris au grapin un grand exemplaire de *Carcharias glaucus* et que l'animal était déjà à moitié retiré de l'eau, trois exemplaires du poisson *Naucrates ductor*, le „pilote de requin", évoluaient sans cesse autour de la queue du captif. Nous tentions sans y réussir, de les prendre à l'aide d'un petit filet à la main; en vrais „pilotes" il ne se sauvèrent pas et nous finîmes par nous en saisir avec un filet vertical de Hensen. C'est un trait de remarquable dévouement au requin qu'ils accompagnaient."

This was an operation of some duration, during which the three fishes did not leave the tail of the shark.

Naucrates ductor Günther, Cat. Brit. Mus. II. 1860, p. 374.
Naucrates indicus Kner, Novara-Exp. Fische 1865—67, p. 145.
Naucrates et Nauclerus Lütken, Vidensk. Medd. Naturh. Foren. 1865, p. 205.
Naucrates ductor Klunzinger, Abh. zool. bot. Ges. Wien XXI. 1871, p. 445.
Naucrates ductor Bleeker, Ned. Tijdschr. Dierk. IV. (1871) 1872, p. 132.
Naucrates ductor Günther, Fische Südsee, 1876, p. 137.
Naucrates ductor Day, Fish. India, 4°, 1878—88, p. 229.
Naucrates ductor Lütken, Spolia atlantica 1880, p. 96 (metamorphosis).
Naucrates ductor Macleay, Descr. Cat. Austr. Fish. I. 1881, p. 194.
Naucrates ductor Klunzinger, Fische Roth. Meer. 1884, p. 102.
Naucrates ductor Jordan & Evermann, Fish. N. & Middle America I. 1896, p. 900.
Naucrates ductor Jordan & Evermann, Bull. U. S. Fish. Comm. XXIII. (1903) 1905, p. 182.
Naucrates ductor M. Weber, Siboga-Exp. Fische LVII. 1913, p. 392.
Naucrates indicus Wakiya, Ann. Carnegie Mus. XV. 1924, p. 232.
Naucrates ductor Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 560.
Naucrates ductor McCulloch, Rec. Austral. Mus. XV. 1926, p. 34 (juvenile stages)
Naucrates ductor Fowler, Fish. Oceania, Bishop Mus. X. 1928, p. 142.

Height equal to length of head or slightly less, about 4 in length; eye 5 to nearly 7 in head, according to total length; its diameter about twice in snout; maxillary thrice in head, reaching anterior border of eye or almost so. Height of anterior dorsal rays less than half length of head; those of anal still less, their origin slightly before middle of soft dorsal. About 18 gillrakers. For other characters see description of genus. Colour grayish above, lighter below, with 6—7 dark crossbands, less conspicuous with age, intruding dorsal and anal in young stage; caudal blackish with white tips; inside of pectoral and anal dusky; the metamorphosis in colouration shows fig. 61, a transitional state from *Xystophorus* to *Nauclerus*. Length up to 600 mm.

Habitat: West coast Sumatra; Banda Sea!; Ambon. — Red Sea, Natal coast, Madagascar, Mauritius, Muscat, British India, Ceylon, China, Japan, N. S. Wales, Tasmania, New Zealand, Hawaiian Islands. Also distributed in the tropical and subtropical Atlantic.

14. (II). Family RACHYCENTRIDAE.

Elongate, subcylindrical; head depressed, broad; mouth terminal, nearly horizontal, rather wide, the maxillary reaching about frontborder of small eye, which is encircled by a narrow adipose eyelid. Covered by small, pointed or roundish scales, also on cheeks, on top of operculum and scattered on occiput, head otherwise naked; lateral line slightly waving anteriorly, caudal keel wanting. Intermaxillaries not protractile; praeoperculum entire. Seven branchiostegals, pseudobranchiae present, gillmembranes not connected, free from isthmus. Gillrakers short, stout. Broad bands of villiform teeth in jaws, minute ones on vomer, palatines and tongue. First dorsal consisting of VII—IX, usually VIII short, broad, free spines, depressible into a groove. Soft dorsal long, the anterior rays forming in the adult a somewhat falcate lobe, anal of similar form but shorter, with two or three anterior undivided rays of which the anterior may be considered as spines. No finlets. Caudal in adult emarginate. Pectorals pointed, ventrals inserted somewhat before their base. [1]).

Distribution: that of the single genus known.

Rachycentron Kaup.

(Kaup, Isis XIX. 1826, p. 89).
Elacate Cuvier & Valenciennes, Hist. nat. Poiss. VIII. 1831, p. 328.

For generic characters see those of the family.

Distribution: that of the single species known.

1. **Rachycentron canadus** (L). [Fig. 63 p. 303].

Gasterosteus canadus Linnaeus, Syst. nat. ed. XII. 1766, p. 491.
Scomber niger Bloch, Ichthyologia 1793, tab. 337.
Centronotus gardenii Lacépède, Hist. nat. Poiss. III. 1803, p. 357.
Elacate pondiceriana Cuvier & Valenciennes, Hist. nat. Poiss. VIII. 1831, p. 329.
Elacate motta Cuvier & Valenciennes, l. c. p. 332.
Elacate malabarica Cuvier & Valenciennes, ibidem.
Elacate atlantica Cuvier & Valenciennes, l. c. p. 334.
Elacate bivittata Cuvier & Valenciennes, l. c. p. 338.
Elacate pondiceriana Rüppell, Neue Wirbelth. Fische, 1835, p. 43.
Elacate bivittata Bleeker, Nat. & Geneesk. Arch. Ned. Ind. (3) II. 1845, p. 516.
Elacate hexacantha Bleeker, ibidem.
Elacate bivittata Cantor, Journ. Asiat. Soc. Bengal XVIII. 1850, p. 1098.
Elacate motta Bleeker, Makreel. Vissch. Verh. Batav. Gen. XXIV. 1852, p. 42.
Elacate nigra Günther, Cat. Brit. Mus. II. 1860, p. 375.
Elacate nigra Bleeker, Versl. Akad. Amsterdam XIV. 1862, p. 109.
Elacate malabarica Guichenot, Mém. Soc. Sc. nat. Cherbourg XII. 1866, p. 146.
Elacate nigra Playfair & Günther, Fish. Zanzibar 1866, p. 67.
Elacate nigra Klunzinger, Abh. zool. bot. Ges. Wien, XXI. 1871, p. 445. — Fische Roth. Meer. 1884, p. 114.

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[1]) The osteological characters of this family is studied by Gill & Tate Regan, showing its close relation with the *Carangidae*.

Elacate nigra de Castelnau, Proc. Linn. Soc. N. S. Wales III. 1879, p. 381.
Elacate nigra Macleay, Descr. Cat. Austral. Fish. I. 1881, p. 195.
Elacate nigra Day, Fish. India 4°. 1878—88, p. 256.
Elacate canada Steindachner, Ann. Hofmus. Wien. XI. 1896, p. 225.
Rachycentron canadus Jordan & Evermann, Fish. N. & Middle America 1896, I. p. 948.
Rachycentron pondicerianus Fowler, Journ. Acad. Nat. Sc. Philadelphia (2) XII, 1904, p. 513.
Rachycentron canadus Evermann & Seale, Bull. Bur. Fish. XXVI. 1906, p. 61.
Rachycentron pondicerrianum Jordan & Seale, l. c. (1906) 1907, p. 14.
Rachycentron canadum Jordan & Richardson, l. c. XXVII. 1908, p. 251.
Rachycentron pondicerianum McCulloch, Proc. Linn. Soc. N. S. Wales, XL. 1915. p. 263.
Rachycentron pondicerianum McCulloch, Rec. Austral. Mus. XV. 1926, p. 30.
Rachycentrum canadus Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 511.

D.[1] VII—IX; D.[2] 3—4, 30—33; A. II—III, 23—25.

Height, according to age 7.50—5.7; nearly cylindrical, greatest height at origin of second dorsal, thence to snout and to caudal declivous in a nearly straight line. Head 4—4.1, much depressed and flat. Eye 6 to more than 8; twice to more than 3.5 in broad, low snout. Maxillary about 2.5 in head, terminating below frontborder of eye. Dorsal spines short but strong. Anterior dorsal and anal rays after youth elevated into a somewhat pointed lobe; caudal in adult lunate, the lobes pointed, the upper longer; in young the central caudal rays are much prolonged, lateron the fin becoming obtuse, than slightly emarginate, till its final form is reached. Also the low placed pectorals becoming more falcate with growth, being finally somewhat shorter than head and about two and a half times longer than ventrals. Colour deep brown, sharply defined by a more or less silvery band from the yellowish colour of abdomen; in young there is a second, more dorsal, light band, with a dark band between them; they have also the otherwise dark-brown caudal with white outer edges. Length up to 1200 mm.

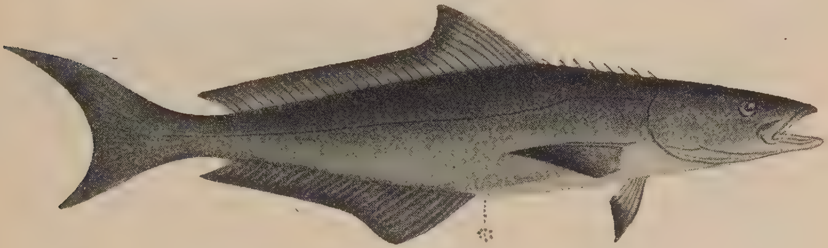

Fig. 63. *Rachycentron canadus* (L.) After Rüppell.

Nom. indig: Gabus laut and Buntut karbo (Malay. Batavia).

Habitat: Sea of Penang; Singapore; Bintang; Banka; Java (Batavia, Samarang, Japara, Prigi, Tanara); Sumatra (Padang, Benkulen); Borneo (Singkawang); Celebes (Makassar); Ambon; Batjan. — Red Sea, Zanzibar, Madagascar, Muscat, British India, Bangkok, China, Japan, Formosa, Philippines, Australia (New South Wales, Queensland), Vanicolo. Also warm parts of Atlantic, but not recorded from the Eastern Pacific.

Note. This pelagic fish, prefering largely the open sea, was formerly united with *Echeneis* on account of a superficial resemblance.

15. (III). Family POMATOMIDAE.

Body oblong, compressed, rather robust, head large with a strong occipital keel and rather wide, oblique mouth; the intermaxillaries protractile; lower jaw prominent; maxillary with a large supplemental bone, exposed; praeoperculum finely serrated or slightly denticulated along its lower edge; operculum ending in a flat point. Scales cycloid, of moderate size, present on cheeks and opercles, head otherwise naked, lateral line parallel to dorsal profile, without scutes or caudal keel. Seven branchiostegals, pseudobranchiae large; four gills, a slit behind fourth. About 10 slender gillrakers on lower branch of first branchial arch. Gillmembranes not connected, free from isthmus. Teeth in jaws strong, compressed, unequal, widely set, in a single series, besides in upper jaw an inner series of small depressible teeth; villiform teeth in a triangular patch on vomer, in bands on palatines and tongue. Two dorsals, the first with about VII—VIII, weak, connected spines, depressible into a groove; second dorsal and anal of about equal length, both fins long

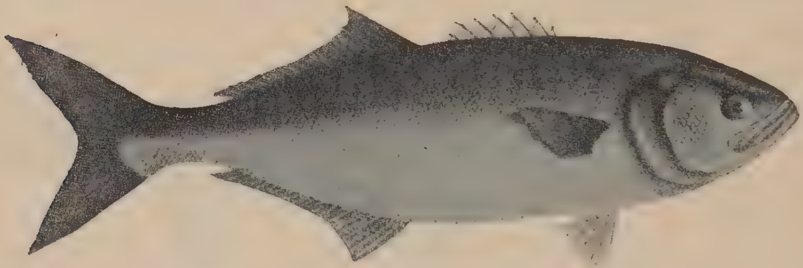

Fig. 64. *Pomatomus saltator* (L.) The one or two detached anal spines are hidden in the skin. After Waite.

and densely scaly, without finlets; the anal preceded by one or two small free spines, sometimes hidden in the skin. Pectorals rather short; ventrals thoracic, short; caudal forked, with broad, pointed lobes.

Distribution: that of the single species known.

1. Pomatomus Lacépède.

(Lacépède, Hist. nat. Poiss. IV. 1803, p. 436).

Lopharis Rafinesque, Caratt. Nuovi Gen. 1810, p. 52.
Gonenion Rafinesque, l. c. p. 53.
Temnodon Cuvier, Règne Anim. ed. Ia, II. 1817, p. 346.
Sparactodon Rochebrune, Bull. Soc. Philom. (7) IV. 1817, p. 162.

For characters of the single genus see those of the family.
Distribution: that of the single species known.

1. Pomatomus saltator (L.) [Fig. 64 p. 304].

Perca saltatrix Linnaeus, Syst. Nat. ed. X. 1758, p. 293.
Gasterosteus saltatrix Linnaeus, l. c. ed. XII. 1766, p. 491.
Perca lophar Forskål, Descr. Animal. 1775, p. 38.
Cheilodipterus heptacanthus Lacépède, Hist. nat. Poiss. III. 1802, p. 542.
Pomatomus skib Lacépède, l. c. IV. 1803, p. 436.
Lopharis mediterraneus Rafinesque, Indice 1810, p. 17.
Gonenion serra Rafinesque, Caratteri, 1810, p. 53.
Temnodon heptacanthus Quoy & Gaimard, Voy. Uranie & Physic. 1824, p. 400.
Temnodon saltator Cuvier & Valenciennes, Hist. nat. Poiss. IX. 1833, p. 225.
? *Temnodon javanicus* Bleeker, Makreel. Vissch. Verh. Batav. Gen. XXIV. 1852, p. 74.
Temnodon saltator Bleeker, Nat. Tijdschr. Ned. Ind. XXI. 1860, p. 64.
Temnodon saltator Günther, Cat. Brit. Mus. II. 1860, p. 479.
Temnodon conidens de Castelnau, Mém. Poissons Afr. Austr. 1861, p. 4.
Temnodon saltator de Castelnau, ibidem.
Cheilodipterus saltator Bleeker, Ned. Tijdschr. Dierk. II. 1865, p. 289.
Cheilodipterus heptacanthus Vaillant, Bull. Soc. Philom. (6) XII. (1875) 1877, p. 29.
Sparactodon nalual de Rochebrune, Bull. Soc. Philom. 1880, p. 159.
Temnodon saltator Macleay, Descr. Cat. Austral. Fish. I. 1881, p. 179.
Pomatomus saltatrix McCulloch, Check-list fish. N. S. Wales II. 1919, p. 51.
Pomatomus saltator Waite, Records Austral. Mus. II. 1921, p. 103.
Pomatomus saltator Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 509.

D.^{1} VII—VIII, D.^{2} I 24—26; A. I—II, I 26—28; L. l. 90—100; L. tr. $\frac{8}{19-20}$.

Height 3.50—4; head about 3.50 in length. Eye 4 (in young) to 7 in head; about equal to snout and interorbital space, in adult half that proportion. Maxillary reaches in young about below posterior third, in adult beyond hindmargin of eye. Pectorals a little more than half length of head. For other characters see those of the family. Colour bluish or greenish above, silvery below, a blackish blotch at base of pectorals. Length up to about 1000 mm.

Habitat: Widely distributed in the warm and temperate parts of Atlantic, Indic (Delagoa Bay, Natal Coast, Madagascar) and all Australian Coasts; very rare in the Archipelago, from there only recorded from Ambon.

16. (IV). Family LACTARIIDAE.

Body oblong, compressed; head compressed, with well developed occipital crest, its profile gradually rising to first dorsal fin in a slightly convex line. Eye in anterior half of head. Mouth large, strongly oblique, lower jaw with prominent chin, maxillary with supplemental bone, exposed, posteriorly broader than narrow praeorbital. Scales cycloid, of moderate size, deciduous; lateral line parallel to dorsal profile, with scales of larger size, provided with conspicuous sensory tubes; no shields or scutes, nor a caudal keel. Seven branchiostegals; pseudobranchiae present; gillopening wide; gillmembranes not connected, free from isthmus. Praeoperculum entire, hindborder of operculum with an excavation and ending below it in a soft point. Jaws with small, curved, pointed teeth; in the lower jaw in a single series, anteriorly with a pair or a single canine, in the upper jaw in a villiform band with one or two pairs of canines near symphysis; small teeth on vomer, palatines and tongue. First dorsal with seven or eight feeble spines, connected by a deeply notched membrane, second dorsal with numerous rays; anal somewhat longer, with three feeble spines; both fins covered with scales,

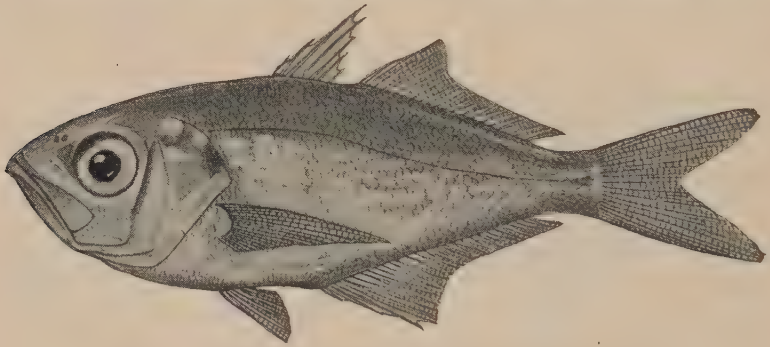

Fig. 65. *Lactarius lactarius* (Bl. Schn.) × $1^1/_2$ nat. size.

without finlets. Pectorals pointed, somewhat shorter than head; ventrals inserted below base of pectorals. Caudal deeply emarginate with equal lobes. Upper surface of head with large muciferous cavities; vertebrae 24 (10 + 14), no subocular shelf, air-bladder bifurcate anteriorly and posteriorly.

Distribution: that of the single genus known.

1. **Lactarius** C. V.

(Cuvier & Valenciennes, Hist. nat. Poiss. IX. 1833, p. 237).

For characters of the genus see those of the family.

Distribution: Seas of British India, of the indo-australian Archipelago and Australia.

1. **Lactarius lactarius** (Bl. Sch.) [Fig. 65 p. 306].

Scomber lactarius Bloch, Schneider, Syst. Ichth. 1801, p. 31.
Seriola lactaria Cuvier, Règne Anim. 2e edit. II. 1829, p. 206.
Lactarius delicatulus Cuvier & Valenciennes, Hist. nat. Poiss. IX. 1833. p. 238.
Lactarius delicatulus Bleeker, Nat. & Geneesk. Arch. Ned. Indië (3) II. 1845, p. 518.
Lactarius delicatulus Cantor, Journ. Asiat. Soc. Bengal XVIII. 1850, p. 1120.
Lactarius delicatulus Bleeker, Makreel. Vissch. Verh. Batav. Gen. XXIV. 1852 p. 74.
Lactarius delicatulus Günther, Cat. Brit. Mus. II. 1860, p. 507.
Lactarius delicatulus Day, Fish. India 4°, 1878—88, p. 245.
Lactarius delicatulus Macleay, Proc. Linn. Soc. N. S. Wales IX. 1884, p. 26.
Lactarius lactarius Evermann & Seale, Bull. Bureau Fish. XXVI. (1906) 1907, p. 63.
? *Lactarius burmanicus* Lloyd, Records Indian Mus. I. 1907, p. 229.
Lactarius lactarius Seale, Philippine Journ. Sc. V. 1910, p. 270.

$D.^1$ VII—VIII, $D.^2$ I 20—22; A. III, 25—28; L. l. 74—80.

Height about 2.8, head about 3 in length; eye more or less than 3.50 in head, equal to convex interorbital space and twice or something less in snout. Maxillary about twice in head, reaching to middle of eye or hindborder of pupil. Third dorsal spine the longest; soft dorsal highest anteriorly, equalling nearly first dorsal and half height of body. Ventrals half length of pectorals. For other characters see those of the family. Colour grayish above lateral line, silvery below, an opercular black spot; dorsal and caudal with a black or dusky border, fins otherwise yellowish or hyaline. Length 275 mm. [Specimen of BLEEKER's collection in the Amsterdam Museum seen by us].

Nom. indig.: Susu (Malay. Batavia); Limat (Tegal); Tannah (Javan. Samarang).

Habitat: Penang; Singapore; Sumatra (Telokbetong, Benkulen, Padang, Tiku, Priaman, Siboga, Deli!); Nias; Java (Batavia, Palabuan Ratu); Madura; Borneo (Sandakan, Singkawang); Celebes (Makassar); Ambon; Misol; Waigeu. — Muscat, British India, Ceylon, Malay Peninsula, Burma, China, Philippines, Queensland.

17. (V). Family MENIDAE.

Body strongly compressed, nearly triangular, with a slightly rounded, nearly horizontal dorsal and an angulated ventral profile, with prominent trenchant abdomen, covered with minute scales, not visible with the naked eye and only perceptible to the touch; lateral line about parallel with dorsal profile, ceasing below the end of the dorsal fin, occasionally continued on the upper caudal lobe, with a lower descending branch. Head small with high occipital crest and small, nearly vertical mouth, the intermaxillaries protractile upwards. Praeoperculum and the strongly rounded operculum entire. Seven branchiostegals; gill-opening wide, gillmembranes not connected, free from isthmus. Teeth in jaws in villiform bands, none on palate. Single dorsal long, in young with nine spines, in adult without spines, the anterior undivided rays a little elevated; anal in young with two spines and normal rays, lateron without spines, the numerous

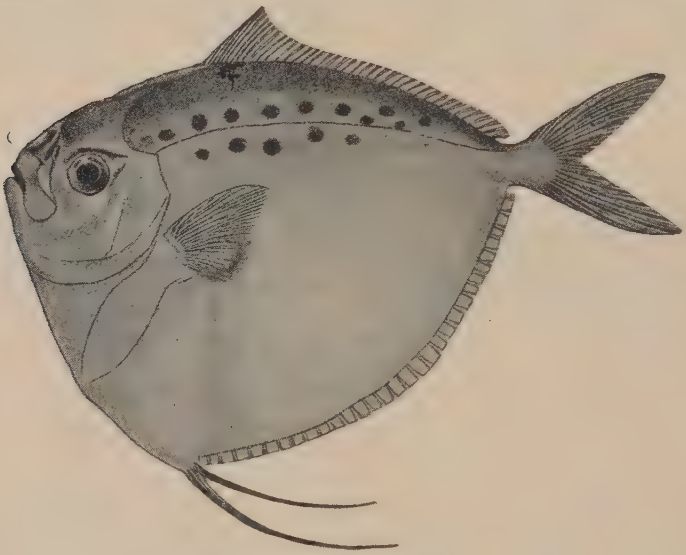

Fig. 66. *Mene maculata* (Bl. Schn.) After Day.

rays enveloped in the skin, their wideset free extremities forming broad, flat processes. Caudal deeply incised, the lobes equal. Pectorals as long as head; ventrals inserted somewhat before them, situated on top of abdomen, with a short spine and five rays, in young filiform, in adult the first compressed and very long. No finlets or caudal keel. Vertebrae 23 (9 + 14).

Distribution: that of the single species known.

1. **Mene** Lacépède.

(Lacépède, Hist. nat. Poiss. V. 1803, p. 479.

For the characters of this aberrant Carangid, with the arrangement of the mouthparts reminding that of the Carangid *Micropteryx* Agass., see the description of the monotypic family.

Distribution: that of the single species known.

1. **Mene maculata** (Bl. Schn.) [Fig. 66 p. 308].

Zeus maculatus Bloch, Schneider, Syst. Ichth. 1801, p. 95.
Mene anna carolina Lacépède, Hist. nat. Poiss. V. 1803, p. 479, 480.
Mene maculata Cuvier & Valenciennes, Hist. nat. Poiss. X. 1835, p. 104.
Mene maculata Bleeker, Nat. & Geneesk. Arch. Ned. Indië (3) II. 1845, p. 518.
Mene maculata Cantor, Journ. Asiat. Soc. Bengal XVIII. 1850, p. 1136.
Mene maculata Bleeker, Makreel. Vissch. Verh. Batav. Gen. XXIV. 1852, p. 86.
Mene maculata Günther, Cat. Brit. Mus. II. 1860, p. 415.
Mene Anna-carolina Bleeker, Japon, Verh. Akad. Amsterdam XVIII. (1877) 1878, p. 16.
Mene maculata Day, Fish. India 4°, 1878—88, p. 249.
Mene maculata Jordan & Seale, Bull. Bur. Fish. XXVI. (1906) 1907, p. 15.
Mene maculata McCulloch, Mem. Queensl. Mus. VII. 1922, p. 241.

D. 3—4, 40—42; A. 30—32.

Height about 1.4 in length; head about 3.3, obtuse, higher than long. Eye nearly thrice in head, situated in its middle, behind the nearly vertical maxillary which extends below horizontal of lower border of eye. For other characters see those of the family. Colour bluish above, sides and belly silvery; two to four irregular series of lead-coloured round spots above and below lateral line; fins hyaline, dorsal and caudal and ventral filaments dusky. Length more than 200 mm. [Specimen of BLEEKER's collection seen by us].

Nom. indig.: Golok kassut (Malay. Batavia).

Habitat: Sea of Penang; Singapore; Sumatra (Benkulen, Padang, Ulakan, Priaman); Java (Batavia, Japara); Celebes (Makassar, Badjoa); Ambon; Batjan. — Aden, Zanzibar, Madagascar, British India, Ceylon, China, Japan, Formosa, Philippines, Queensland. — Seems to live in deeper costal water.

18. Family LEIOGNATHIDAE.

(Gerridae Günther pro parte).

Body oblong or elevated, more or less compressed, covered with cycloid, smooth scales, either large and present on head, or small and wanting on head [1]) and often on breast, where they may be reduced to thin, diaphanous plates, giving the breast the appearance of nakedness. Lateral line complete or the sensory tubes, getting obsolete, cease before or below the end of dorsal. Head on top with bony ridges and with a nuchal spine or without them and smooth. Eyes lateral. Gape of mouth small, horizontal or oblique; when closed the mandible, which is straight or concave, sometimes ascends vertically but usually at an angle of about 35° to 45°. Mouth very protractile, the long intermaxillary pedicels lying in a groove formed by the bifurcation of the occipital crest; when fully protracted it forms a tube directed horizontally, dorsally or somewhat downwards. Proximal extremity of maxillary curved, slipping under praeorbital, distal extremity exposed, without a supplemental bone. Praeoperculum entire or its lower margin more or less serrate. Five or six branchiostegals; gillmembranes free, attached to isthmus or not. Pseudobranchiae present or absent. Lower pharyngeal bones free or united by suture or coossified. Teeth wanting on palate; in jaws minute, in a single, setiform series or pluriseriate, or in upper jaw a series of sharp teeth and a curved canine on each side of symphysis, in lower jaw a series of curved, pointed teeth, with a pair of symphysial canines, with a notch between them to receive the upper canines. A single dorsal with VIII to XI spines and 10 to 16 rays, with a conspicuous basal sheath; anal with III to V spines, continuous with 7 to 8 or 13 to 14 rays. Pectorals more or less falcate; ventrals thoracal or subthoracal, I 5, with a large scale-like axillary process. Caudal emarginate or deeply incised. No subocular shelf, the suborbitals not or but feebly ossified.

Distribution: Small or moderate-sized carnivorous fishes, inhabiting the costal water of all tropical seas. The genera *Leiognathus*, *Gazza* and *Pentaprion* restricted to the eastern hemisphere where they are distributed throughout the costal waters of the Indo-Pacific from Red Sea and East coast of

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[1]) With the exception of *Leiognathus elongatus* (Gthr.) (*L. stercorarius* Evermann & Seale).

Africa to the Pacific Islands, Japan and China; some species entering estuaries and fresh water.

Note. The ichthyologists differ greatly about associating the Leiognathidae with the Gerridae in one family or separating them. BLEEKER f.i. treated *Equula* (*Leiognathus*) and *Gazza* under the Carangidae and gave *Gerres* and *Pentaprion* as subfamily *Gerriformes* a place in what he named "Percoidei". GÜNTHER (Cat. Brit. Mus. IV. 1862, p. 252) also removed them far away from one another and placed the family Gerridae in the „Acanthopterygii Pharyngognathi", while he united *Equula* and *Gazza* with the Carangidae, laying stress upon the fact, that in some species of *Gerres* the lower pharyngeal bones are united by suture or coossified: a peculiarity of no far reaching importance as in other species this „pharyngognathy" is not developed. REGAN (1913), on the other hand, recognizes a family *Liognathidae* comprising *Leiognathus*, *Gazza*, and *Gerres* and its allies, which, after him is closely related to the *Lutianidae*. JORDAN in his latest Classification of fishes (1923) writes: "the resemblance of *Leiognathus* to *Gerres* seems to be superficial not indicating any special affinity". We can not agree with this assumption and unite both groups as *Leiognathidae*; *Leiognathus* Lacépède (1803) being the older name than *Gerres* Cuvier (1824).

Key to the Indo-australian genera of Leiognathidae.

I. Top of head with bony ridges and a nuchal spine. Scales small, wanting on head [1]). Five branchiostegals. Gill-membranes attached to isthmus. D. VIII 15—16; A. III 14.
    1. Teeth in jaws minute in a single series . . . . 1. *Leiognathus* p. 312.
    2. In upper jaw sharp teeth in a single series with a curved canine on each side of symphysis; in lower jaw a series of curved, pointed teeth, with a pair of symphysial canines, with a notch between them to receive the upper canines . . . . 2. *Gazza* p. 338.

II. Top of head smooth, without nuchal spine. Scales large, more or less deciduous, present on head. Six branchiostegals. Gill-membranes not attached to isthmus.
    1. D. IX—X 10—11; A. III 7—8. Pseudobranchiae concealed. Lower pharyngeal bones united by suture or coossified. . . . . 3. *Gerres* p. 341.
    2. D. X—XI 14—15; A. V. 13—14. Pseudobranchiae present. Lower pharyngeal bones free . . . . . 4. *Pentaprion* p. 359.

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[1] With exception of *L. elongatus* (Gthr.)

1. **Leiognathus** Lacépède.

(Lacépède, Hist. nat. Poissons IV. 1803, p. 448).

Equula Cuvier, Règne Animal, II. 1817, p. 223.

Deveximentum Fowler, Journ. Acad. nat. Sc. Philadelphia, 1904, p. 517 (p.p.).

Body compressed, oblong, oval or elevated; dorsal and ventral profile equal, subequal or usually the dorsal more convex. Covered with small, cycloid, more or less conspicuous, sometimes deciduous scales; they are wanting on head [1]) and in some species on a triangular space on breast, caudally bordered by a line from base of pectoral to ventral, or the scaly covering changes abruptly at that line and is replaced on the breast by thin, diaphanous scaly plates giving to the breast the appearance of nakedness. Lateral line more or less curved, complete or the small sensory tubes get obsolete and terminate before or below end of dorsal fin. Head rather small, pointed or truncate, its rostro-dorsal profile straight or curved with a more or less deep interorbital concavity bordered on each side by a supraorbital bony ridge, both continued as outer border of a nuchal spine, which ends at some distance from dorsal fin. The ridges

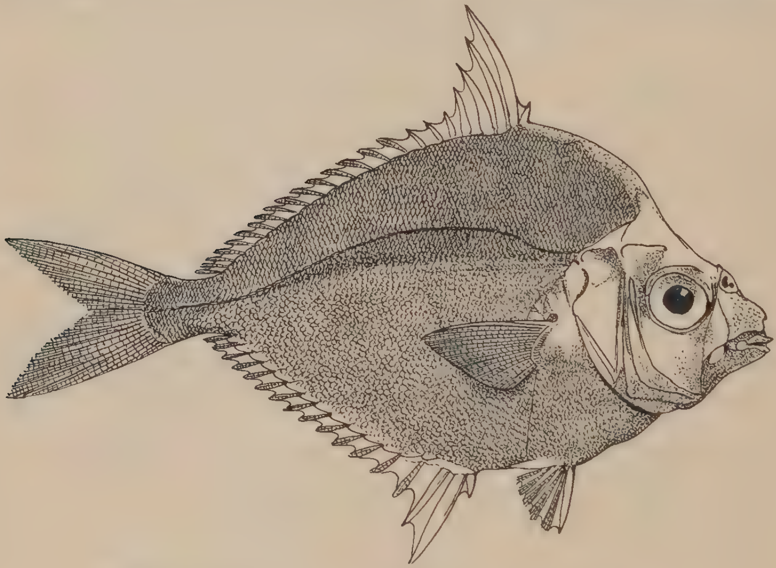

Fig. 67. *Leiognathus dussumieri* (C. V.) × 4/7 nat size.

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[1]) The only species with scaled cheeks, we know of, is *L. elongatus* Günther (1874) = *L. stercorarius* Everm. & Seale 1907 = *L. elongatus* Smith & Pope 1903.

commence at the inner one of a pair of more or less pronounced postnasal spines; the outer of which is situated near rim of orbit, which rim superiorly may be crenulated. Mouth small, horizontal or oblique; when protracted forming a tube directed horizontally (Fig. 72) or more or less downwards or upwards (Fig, 68, 69). The mandible straight or concave, when closed ascending nearly vertically or at an angle of about 35° to 45°. Lower margin of praeoperculum serrate. Five branchiostegals. Gillmembranes attached to isthmus. Gillrakers 11 to 22, of various length. Pseudobranchiae present. Minute setiform teeth in a single series in jaws; palate toothless. A single dorsal with VIII spines and 15—16 rays; anal with III spines and 14 rays; the second dorsal and anal spine the longest, in some species prolonged into a filament. Soft dorsal and anal with a basal scaly sheath, with interradial spines. Pectorals short; ventrals I 5 with an axillary scale-like process. Caudal deeply emarginate, the acute lobes spreading.

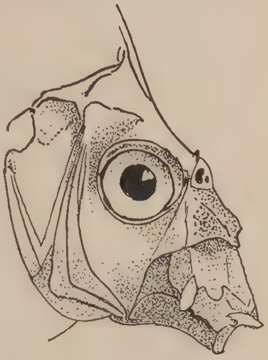

Fig. 68. Tube of protracted mouth of *Leiognathus dussumieri* (C. V.) directed downwards. nat. size.

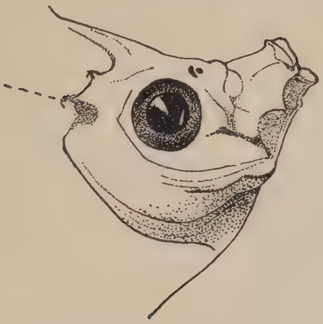

Fig. 69. Tube of protracted mouth of *Leiognathus ruconius* (H. B.) directed upwards. × $1^1/_2$ nat. size.

Distribution: Small, carnivorous fishes, not attaining more than about 180 mm. length; distributed from Red Sea and East coast of Africa through Indic and Pacific to China, Japan and the Pacific Islands. Some species are locally restricted, other are living in costal waters in shoals and frequent the mouth of rivers and inhabit fresh water lakes. They are important market fishes on account of their abundancy though they are not valued as food.

Key to the indo-australian species of Leiognathus.

I. Mouth very small, oblique; when fully protracted forming a horizontally or upwards directed tube;

when closed, the mandible ascending nearly vertically. Ventral profile much more convex than the dorsal.

a. Oblong, height about twice in length. Scales minute, about 50 in a longitudinal series. No markings on head . . . . 1. *L. insidiator* p. 316.

b. Oval, height 1.50 to less than twice in length. Scales middle-sized, about 30 in a longitudinal series. A black line from frontborder of orbit to chin, a black opercular spot. . . . . . . 2. *L. ruconius* p. 317.

II. Mouth small, horizontal or slightly downward directed; when fully protracted forming a more or less downward directed tube; when closed the mandible ascending at an angle of 30° to 45°. Dorsal and ventral profile equal, subequal or usually the dorsal more convex.

A. Cheeks scaly; height more than thrice in length; mandible ascending at an angle of 30°. . . 3. *L. elongatus* p. 318

B. Head totally without scales; height at most thrice in length; mandible ascending at an angle of 35° to 45°.

a. Rostro-occipital profile curved from truncate snout to concave interorbital space, followed by a steep convex nape. Dorsal profile more convex than ventral. Height 1.7–1.9. Commencement of gape of mouth below lower border of eye. Nuchal spine longerthan eye.

a′. Scales on breast very thin, diaphanous, giving breast a naked appearance. Mandible strongly concave. Head about 3 in length; eye about 3 in head, about equal to snout. Spinous dorsal without black patch.

1. Second dorsal spine elongated, terminally flexible, nearly equal to height of body or longer; second anal spine similar but shorter. . . . . 4. *L. fasciatus* p. 320.

2. Second dorsal spine more than twice in height of body . . . . 5. *L. equulus* p. 322.

b′. Breast conspicuously covered by normal scales. Mandible slightly concave.

1. Head 3 in length; eye 2.50 in head, longer than obtuse snout. Maxillary reaching vertical through middle of eye. Snout densely dotted with black, spinous dorsal black margined . . 6. *L. splendens* p. 324.

2. Head 3.4—3.7 in length; eye 3 in head, shorter than or about equal to snout. Maxillary reaching frontborder of eye. 7. *L. dussumieri* p. 326.
Snout and spinous dorsal without black.

b. Rostro-dorsal profile ascending in a more or less straight line, with or without a slight interorbital or frontal concavity and continued without strong or abrupt nuchal elevation in dorsal profile, the convexity of which is equal to or somewhat more or less than ventral profile. Snout not truncate. Commencement of gape of mouth opposite lower third of eye.

- a′. Lateral line continued to base of caudal.
  - 1. Second dorsal spine prolonged, filiform, higher than body; without a nuchal band. . . . . 8. *L. leuciscus* p. 327.
  - 2. Second dorsal spine equal to or lower than half height of body; a black band on nape.
    - α. Breast covered with normal scales 9. *L. blochi* p. 328.
    - β. Breast destitute of scales . . . 10. *L. brevirostris* p. 330.
- b′. Lateral line ending before, below or somewhat behind end of dorsal, the last sensory tubes getting obsolete.
  - 1. Second dorsal spine exceeding height of body. . . . . 11. *L. smithhursti* p. 331.
  - 2. Second dorsal spine half height of body or less.
    - a″. Breast naked; dorsal profile more convex than ventral. . . . . 12. *L. daura* p. 332.
    - b″. Breast scaly.
      - α. Abdomen trenchant, more convex than opposite dorsal profile. Height 2, head 3.5 in length. Eye nearly 3 in head. Spinous dorsal with an orange spot, inferiorly edged with black. . . . . 13. *L. bindus* p. 334.
      - β. Dorsal and ventral profile equally convex or nearly so.
        - α′. Height in adult 2.3, head 3.5 in length; eye about twice in head. Back with irregular dark spots or angulated lines, often serially arranged . . . . . 14. *L. berbis* p. 336.
        - β′. Height in adult 2.5—3, head 3.4—3.7 in length; eye 2.5—3 in head. Back with dark irregular spots. 15. *L. lineolatus* p. 337.

1. Leiognathus insidiator (Bl.)

Zeus insidiator Bloch, Ausl. Fische III. 1787, p. 41. — Bloch, Schneider, Syst. ichth. 1801, p. 95.
Zeus insidiator Lacépède, Hist. nat. Poiss. IV. 1803, p. 572, 574.
Equula insidiatrix Cuvier & Valenciennes, Hist. nat. Poiss. X. 1835, p. 98.
Equula insidiatrix Bleeker, Nat. & Geneesk. Arch. Ned. Indië (3) II. 1845, p. 518 (name only).
Equula insidiatrix Cantor, Journ. Asiat. Soc. Bengal XVIII. 1850, p. 1133.
Equula insidiatrix Bleeker, Makreel. Vissch., p. 84, Verh. Batav. Gen. XXIV. 1852.
Equula insidiatrix Günther, Cat. Brit. Mus. II. 1860, p. 504.
Leiognathus insidiator Bleeker, Ned. Tijdschr. Dierk. II. 1865, p. 290.
Equula insidiatrix Kner, Novara-Exp., Fische, 1865—1867, p. 169.
Equula insidiatrix Jouan, Mém. Soc. Sc. Nat. Cherbourg (2) III. 1867, p. 266.
Equula insidiatrix Day, Fish. India 4°, 1878—1888, p. 242.
Deveximentum insidiator Fowler, Journ. Acad. Nat. Sc. Philadelphia (2) XII. 1904, p. 517.
Equula insidiator Jordan & Seale, Bull. Bur. Fish. XXVI. (1906) 1907, p. 15. — Proc. Davenp. Acad. Sc. X. (1905) 1907, p. 8.
Leiognathus insidiator Bean & Weed, Proc. U. S. Nat. Mus. XLII. 1912, p. 604 (name only).
Equula insidiatrix M. Weber, Siboga-Exp. Fische 1913, p. 268.
Leiognathus insidiatrix Jordan & Starks, Ann. Carnegie Mus. XI. 1917, p. 444.
Liognathus insidiator Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 625.
Secutor insidiator Fowler, Fish. Oceania, Mem. Bern. P. Bishop Mus. X. 1928, p. 154.

D. VIII (IX), 16—17; A. III. 14.

Compressed, height 2 or somewhat more, head 3.50 in length, in young much more elongate; dorsal profile less convex than ventral; profile of front strongly concave. Eye 2.50 in head, its diameter somewhat longer than snout and interorbital space. Two minute spines above orbit, postorbital ridge minutely denticulated, the lower margin of praeoperculum more strongly. Mouth oblique; when fully protracted tubular and directed upwards; when closed mandible almost vertical, with very shallow concavity; maxillary reaching to below first third of eye. Teeth minute, in one or two rows. Scales minute, about fifty in a longitudinal line, present on breast, wanting on head and base of pectorals, lateral line running parallel to profile of back, usually lost on caudal peduncle or sometimes below middle or last third of dorsal fin. Gillrakers 17—18 on lower branch of first branchial arch. Dorsal spines rather weak, the second the longest, nearly smooth, the third and fourth slightly shorter, about equal to one third of height of body or half length of head. Second anal spine shorter. Pectorals almost equal to length of head, ventrals of about half length. Caudal deeply emarginate, the lobes somewhat acute. Colour dusky above, silvery below, the back with irregular vertical series of darkish spots, a narrow black line from eye to chin; top of dorsal with a black patch; fins otherwise yellowish or hyaline. Length up to 100 mm. [Specimens of BLEEKER's collection in the Amsterdam Museum seen by us].

Nom. indig.: Pepperek (Malay. Batavia); Pettak or Pettek (Javan. Samarang and Patjitan); Koppeh (Surabaja).

Habitat: Singapore, Penang; Sumatra (Padang Priaman); Nias!; Java (Batavia, Tandjong Priok!); Madura; Bali; Lombok!; Borneo; Celebes (Tanette!; Bulucomba, Badjoa); Ambon. — Madagascar, Seychelles, Delagoa Bay, Natal coast, British India, Ceylon, Tonkin, Hongkong, Philippines, Tahiti.

2. **Leiognathus ruconius** (H. B.) [Fig. 69, p. 313].

Chanda ruconius Hamilton-Buchanan, Fish. Ganges 1822, p. 106, 371.
Equula ruconius Cuvier & Valenciennes, Hist. nat. Poiss. X. 1835, p. 79.
Equula interrupta Cuvier & Valenciennes, l. c. p. 102.
Equula interrupta Bleeker, Makreel. Vissch., p. 85, Verh. Batav. Gen. XXIV. 1852.
? *Equula ruconius* Bleeker, Nalez. Ichth. fauna Bengalen en Hindostan p. 96, l.c. XXV. 1853.
Equula interrupta Günther, Cat. Brit. Mus. II. 1860, p. 504.
Leiognathus interruptus Bleeker, Ned. Tijdschr. Dierk. II. 1865, p. 290.
Equula interrupta Kner, Novara-Exp. Fische, 1865—1867, p. 169.
Equula ruconius Day, Fish. India, 4°, 1878—1888, p. 242.
Equula interrupta Macleay, Descr. Cat. Austral. Fish. I. 1881, p. 185.
Equula ruconius Duncker, Mitth. Naturh. Mus. Hamburg XXI. 1904, p. 157.
Equula ruconia Jordan & Seale, Bull. Bur. Fish. XXVI. (1906) 1907, p. 15.
Equula ruconia Seale, Philipp. Journ. Sc. V. 1910, p. 272.
Equula interrupta M. Weber, Siboga-Exp. Fische 1913, p. 269.

D. VIII. 16; A. III. 14.

Compressed, nearly oval, length 1.50—1.80, head 3.40—3.75 in length; ventral profile much more convex than dorsal; rostro-occipital line of head concave. Eye 2.50 in head, somewhat longer than snout and interorbital space. A single minute spine above eye, supraorbital margin minutely, lower preopercular margin more strongly denticulated. Mouth parts and teeth as in *L. insidiator*, but maxillary reaching only to frontborder of orbit. Scales middle-sized, about thirty in a longitudinal series, easily rubbed of. Lateral line usually reaching to below middle of soft dorsal or slightly farther. Second dorsal spine the longest, conspicuously less than one third of height of body; third dorsal spine serrated inferiorly at its frontborder. Second anal spine shorter than second dorsal spine. Pectorals somewhat shorter than head but more than twice longer than ventrals. Caudal deeply incised, the lobes pointed. Colour silvery, the back slightly dusky with dark vertical lines or series of spots on upper third of body; a black line from front edge of orbit to chin, usually joining that of the other side; a dark spot on upper part of operculum, pectoral axil black, fins hyaline, the spinous dorsal with a black tip. Length up to 80 mm. [Specimen of BLEEKER's collection in the Amsterdam Museum seen by us].

Nom. indig.: Peperrek (Malay. Batavia).

Habitat: Singapore; Sumatra (Bagan Api Api!, Benkulen, Padang, Tiku, Priaman); Java-Sea!; Java (Batavia, Tandjong Priok!, Samarang!); Lombok!; Sumbawa; Borneo (Sandakan); Ambon. — South Arabia, British India, Malay Peninsula, China, Formosa, Philippines, Australia (Port Essington). In sea and estuaries, entering rivers.

Note: *Equula ruconius* Bleeker (Nalez. Bengalen and Hindostan p. 96, Verh. Bat. Gen. XXV. 1853) is a different species from *Chanda ruconius* H. B. = *Equula interrupta* of C. V., Day, Bleeker (1852); a species easy to recognize by its oval form, dark striped back, the black line from the orbit to the chin, visible in the figure of Hamilton-Buchanan, in which otherwise the mouth is faulty. Also *Equula ruconius* Day (P. Z. S. London 1869, p. 302) has erroneously been referred to this species, as already stated by DAY himself.

3. **Leiognathus elongatus** (Gthr.) [Fig. 70 p. 320].

Equula elongata Günther, Ann. Mag. Nat. Hist. (4) XIV. 1874, p. 369.
Equula elongata Meyer, An. Soc. Esp. Hist. nat. XIV. 1885, p. 26.
Leiognathus elongatus Smith & Pope, Proc. U. S. Nat. Mus. XXXI. 1906, p. 466.
Leiognathus stercorarius Evermann & Seale, Bull. Bur. Fish. XXVI. (1906) 1907, p. 67.
Leiognathum elongatum Jordan, Tanaka & Snyder, Journ. Coll. Sc. Univ. Tokyo XXXIII. 1913, p. 132 (name only after Smith & Pope).

$$D. \frac{8}{16}; \ A. \frac{3}{14}.$$

„The height of the body is nearly one fifth of the total (without caudal), the length of the head one fourth. Eye nearly as long as the snout and as the postorbital part of the head. A minute spine above the anterior margin of the orbit; praeopercular margins not serrated. Caudal fin deeply emarginate. Upper half of the body greenish, irregularly marbled with darker; two brown spots at the root of the caudal. Lower half silvery. Length $2^3/_4$ inches."

North Celebes (Dr. A. B. Meyer). [After Günther].

Independent from Günther and using the same specific name Pope & Smith (Proc. U. S. Nat. Mus. XXXI. 1906, p. 466) have described a *Leiognathus elongatus* as a new species. Their diagnosis is as follows:

"Head 3.75; depth 3.75; eye 3.25; snout 3.25; dorsal VIII, 16; anal III, 14.

Body very elongate and moderately compressed, its depth not greater than length of head; dorsal and ventral profiles about evenly curved and tapering gently to the very short and slender peduncle; caudal peduncle about 0.66 diameter of eye; head acute, the upper surface weakly convex, the sides compressed to form a very narrow surface on the ventral side; mandibular but slightly concave; eye of moderate size, its diameter equal to snout; interorbital equal to eye, with a median ridge from snout to occiput and supraocular ridges inclosing triangular space; lower preopercular margin with very fine serrations; scales small, cycloid, deciduous; opercles naked, cheeks scaly; lateral line conspicuous, with about 42 tubular pores; second and third dorsal spines longest, 1.75 in depth of body and 2 in distance from origin of fin to anterior margin of eye; longest anal spine (second) less than 0.5 head; caudal deeply forked; pectorals 1.5 in head; ventrals somewhat less than 2 in head. Colour in alcohol: Yellowish-brown above, with purplish tinge below that may have been silvery in life; scales everywhere covered with fine black punctulations which are larger and more scattered on lower side of head and body: back and sides marked with a number of irregular dark purplish spots and vermiculations; a black spot at base of each dorsal and anal ray; axil of pectoral black; posterior edge of gill cavity black, showing through opercular flap; a short black band on tip of snout above mouth; fins without definite color markings.

Described from a specimen 90 mm. long from Kagoshima, collected June 16, 1903, by H. M. Smith.

This species may be easily recognized by its elongate form and mottled coloration."

Comparing the diagnosis and figure of Smith & Pope, with those, that Evermann & Seale gave from their new species: *Leiognathus stercorarius* (Evermann & Seale, Bur. of fisheries XXVI. (1906) 1907, p. 67) there seems to be no doubt, that both are identical as they are identically characterized by an elongate body, a very small depth, a pointed head with a straight rostro-dorsal profile, the mandible ascending at an angle of only 30°, a scaly chest, a complete lateral line and by the, for a *Leiognathus* extraordinary fact, that the cheeks are scaled. At the same time it seemed probable, that both species are identical with *L.* (*E.*) *elongatus* Günther, but the diagnosis of Günther was to scanty to be sure. Mr. J. R. Norman had therefore the kindness to inform us, that, after carefully comparing the type of *Equula elongata* Günther in the British Museum with the figure of *Leiognathus elongatus* Smith & Pope „he feels pretty certain that the two are identical. Unfortunately, almost all the scales are missing from Günther's type, so that it is impossible to say whether they were ever present on the breast and cheeks. The depth of the body is $4^2/_5$ in the length (without caudal); the lateral line appears to be complete; the second dorsal and the anal spines are both broken; the rostro-dorsal profile is straight". After this valuable information we do not hesitate to unite the three species under Günther's name.

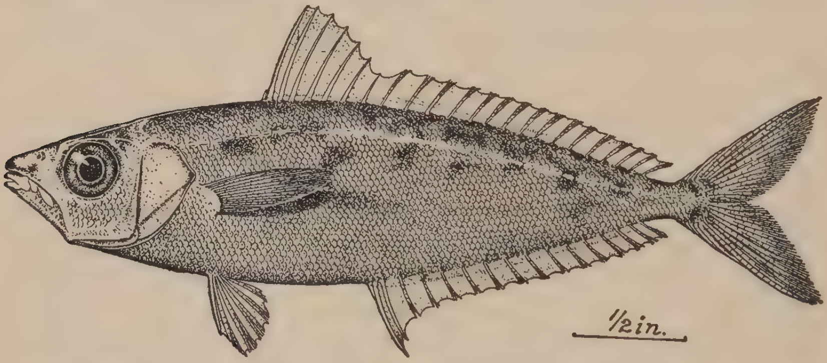

Fig. 70. *Leiognathus elongatus* (Günther) After Smith & Pope.

We have found in our collections a small specimen (39 mm.) from Lalewa, North Nias!.

4. **Leiognathus fasciatus** Lac.

Clupea fasciata Lacépède, Hist. Nat. Poiss. V. 1803. p. 460, 463.
Equula filigera Cuvier, Mém. Mus. Hist. nat. I. 1814, p. 402.

Equula filigera Cuvier & Valenciennes, Hist. nat. Poiss. X. 1835, p. 92.
Equula longispinis Cuvier & Valenciennes, l. c. p. 94.
Equula kara Cuvier & Valenciennes, l. c. p. 95.
Equula fasciata Cuvier & Valenciennes, l. c. p. 96.
Equula filigera Bleeker, Nat. & Geneesk. Arch. Ned. Ind. (3) II. 1845, p. 518.
Equula filigera Cantor, Journ. Asiat. Soc. Bengal XVIII. 1850, p. 1132.
Equula filigera Bleeker, Nat. Tijdschr. Ned. Ind. III. 1852, p. 165. — Makreel. Vissch. p. 79, Verh. Batav. Gen. XXIV. 1852.
Equula fasciata Günther, Cat. Brit. Mus. II. 1860, p. 498.
Leiognathus fasciatus Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 242.
Equula fasciata Kner, Novara-Exp. Fische 1865—67, p. 167.
Equula fasciata Günther, Fische Südsee, 1873—1876, p. 144.
Equula fasciata Day, Fish. India 4°, 1878—1888, p. 243.
Equula fasciata Klunzinger, Fische Roth. Meer. 1884, p. 107.
Equula longispina de Vis, Proc. Linn. Soc. N. S. Wales IX. 1884, p. 542.
Leiognathus fasciatus Jordan & Seale, Bull. Bur. Fish. XXV. (1905) 1906, p. 273. — l. c. XXVI. (1906) 1907, p. 15.
Leiognathus fasciatus Evermann & Seale, l. c. XXVI. (1906) 1907, p. 69.
Aurigequula fasciata Fowler, Proc. Acad. N. Sç. Philadelphia, LXX. 1908, p. 17.
Leiognathus fasciatus Kendall & Goldsborough, Mem. Mus. Comp. Zool. XXVI. 1911, p. 274.
Equula fasciata M. Weber, Siboga-Exp. Fische, 1913, p. 270.
Leiognathus fasciatus Fowler, Fish. Oceania, Mem. Bish. Bern. P. Mus. X. 1928, p. 153.

D. VII—VIII. 16; A. III. 14.

Oblong ovate, compressed, dorsal profile somewhat angulate, more convex than the ventral, the back strongly elevated behind occiput; nuchal spine longer than eye, keeled; height about 2; head more than 3 in length, its fronto-occipital profile deeply depressed. Eye about 3 in head, its diameter equal to snout or somewhat less and about equal to interorbital space. Two supraorbital spines; supraorbital edges entire. Praeopercular angle obtuse. Lower margin of praeoperculum nearly straight and indistinctly serrated. Maxillary extends to below anterior third of eye. Mouth horizontal, when protracted forming a tube with dornward direction, mandibula concave. Teeth minute, in upper jaw in a single series, in lower in villiform bands. Scales minute, wanting on head; on breast till pectoral and about middle of ventral of a special character: very thin, diaphanous, by superficial investigation giving the breast a naked appearance; lateral line with about 65 sensory tubes, terminating at base of caudal. Dorsal spines of moderate strength, the second elongate, terminally flexible and getting filiform, sometimes equalling height of body; the third and fourth spine serrated anteriorly. Second anal spine elongate and usually terminating filiform and flexible. Pectorals equalling head without snout, less than twice longer than ventrals, which do not reach anal. Caudal peduncle as high as long, the fin deeply incised with acute lobes. Colour silvery with more or less diffuse irregular vertical streaks in upper half of body; the pectoral axil brown; fins hyaline. Length up to 150 mm.

Nom. indig.: Peperrek (Malay. Batavia); Pettah (Samarang).

Habitat: Penang; Singapore; Riouw; Bintang; Banka; Nias!; Sumatra (Benkulen); Java (Batavia); Bali; Borneo (Sampit); Celebes (Badjoa, Tanawanko); Saleyer!; Ceram!; Ambon; Obi major; Batjan; Halmahera; Goram; Waigeu; Mysore; Aru; Timor. — Red Sea, Zanzibar, Madagascar, Mayotte, Mauritius, Seychelles, Muscat, British India, Ceylon!, Andamans, Philippines, Queensland, New Britain, Samoa, Fidji Islands. — In sea.

5. **Leiognathus equulus** (Forsk.).

Scomber equula Forskål, Descr. animal. 1775, p. 75.
Scomber edentulus Bloch, Naturgesch. Fische, 1785, Taf. CCCCXXVIII. — Bloch, Schneider, Syst. Ichth. 1801, p. 36.
Leiognathus argenteus Lacépède, Hist. nat. Poiss. IV. 1803, p. 448, 449.
Equula ensifera Cuvier & Valenciennes, Hist. nat. Poiss. X. 1835, p. 66.
Equula caballa Cuvier & Valenciennes, l. c. p. 73.
Equula caballa Rüppell, Neue Wirbelt. Fische 1838, p. 51, 52.
Equula ensifera Bleeker, Nat. & Geneesk. Arch. Ned. Ind. (3) II. 1845, p. 518.
Equula serrulifera Richardson, Voy. „Erebus" & „Terror" Ichth. 1848, p. 137.
Equula caballa Cantor, Journ. Asiat. Soc. Bengal XVIII. 1850, p. 1128.
Equula ensifera Bleeker, Makreel. Vissch. p. 80, Verh. Bat. Gen. XXIV. 1852.
Equula edentula Günther, Cat. Brit. Mus. II. 1860, p. 498.
Equula caballa Günther, l. c. p. 499.
Leiognathus edentulus Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 235.
Equula ensifera Kner, Novara-Exp. Fische 1865—67, p. 166.
Equula edentula Day, Fish. India 4°, 1878—1888, p. 238.
Equula caballa Klunzinger, Sitzb. Akad. Wien. 1880, p. 379.
Equula edentula Macleay, Descr. Cat. Austral. Fish. I. 1881, p. 184.
Equula equula Klunzinger, Fische Roth. Meer. I. 1884, p. 107.
Equula edentula Vinciguerra, Ann. Mus. Civ. Storia Nat. Genova (2) IX. 1890, p. 171.
Leiognathus obscura Seale, Occas. Papers, Bish. Mus. I. 1901, p. 74 (fide Fowler).
Leiognathus edentulum Jordan & Evermann, Proc. U. S. Nat. Mus. XXV. (1902) 1903, p. 338.
? *Leiognathus edentulus* Fowler, Proc. Acad. Nat. Sc. Philadelphia (2) LVII. 1905, p. 510.
Leiognathus edentula Evermann & Seale, Bull. Bur. Fish. XXVI. (1906) 1907, p. 69.
Equula edentula Gilchrist & Thompson, Ann. S. Afric. Mus. VI. 1908, p. 188.

Leiognathus caballa Jordan & Richardson, Bull. Bur. Fish. XXVI. (1907) 1908, p. 253.
Equula edentula de Beaufort, Bijdr. Dierk. Leiden 1913, p. 120.
Leiognathus equula Jordan & Starks, Ann. Carnegie Mus. XI. 1917, p. 444.
Leiognathus equulus Chaudhuri, Mem. Ind. Mus. V. 1923, p. 730 (synon. & reference).
Liognathus equula Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 624.
Leiognathus equula Fowler, Fish. Oceania, Mem. Bern. P. Bishop Mus. X. 1928, p. 153.

D. VIII. 16; A. III. 14.

Moderately compressed; dorsal profile more convex than ventral profile, strongly elevated near commencement of dorsal fin, more so in old specimens, thence running in an almost straight line to caudal peduncle. Height 1.7—1.8 in length [2—2.5 with caudal]; head 3 or slightly more [about 4 with caudal]; its rostro-occipital profile curved with a concavity before nostrils and an other in the occipital region. Eye slightly more or less than thrice in head, about equal to blunt snout, which has thick lips, and to interorbital space. Above frontborder of eye two spines; from the inner one runs a smooth curved supra-orbital ridge obliquely and hindwards, converging with that of the other side; both enclosing the interorbital concavity, which is longer than broad. Thence the ridges diverge on occiput and are finally continued as outer borders of the crested nuchal spine, which is in old specimens equal to one and a half diameter of eye and curved adequate to curvature of back. Commencement of gape of mouth below lower border of eye. Maxillary reaching vertical through inner border of iris. Mandibulary strongly concave. Praeoperculum with an obtuse angle, its lower margin slightly concave and serrated. Mouth, when protracted, directed downwards. In jaws a single series of close set setiform teeth. Scales of moderate size; as diaphanous, thin plates also on breast, wanting only on a triangular space above pectorals 1); lateral line less curved than dorsal profile, terminating at base of caudal, with about 60 sensory tubes. Dorsal spines moderately strong, the second more than

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1) This fish is often described as having a naked breast, but this can only be the result of a somewhat superficial investigation. In the many specimens of different size and from different localities at our disposal, we could always state, when the specimens where somewhat dried up, that the triangular space between base of pectoral, ventral and operculum is covered by diaphanous, thin, platelike scales, in fact of an other character than the other scales of the body, giving the impression of a naked breast.

twice in height of body, the following gradually decreasing in size; the second anal spine as long as head without snout. Pectorals somewhat longer than head without snout; ventrals half length of head, reaching anal or nearly so, with a strong spine and a large axillary scale-like process. Caudal emarginate, the lobes rounded; its peduncle somewhat longer than high. Colour in alcohol silvery with a brownish, grayish or yellowish back, in fresh specimens with faint vertical narrow stripes from back to middle of height; pectoral axil faintly dusky, fins hyaline. Length up to 220 mm. [Specimens of BLEEKER's collection in the Amsterdam Museum seen by us].

Nom. indig.: Peperrek (Malay. Batavia); Tjeraménan (Bandjermassin); Kupi Kupi (Batjan).

Habitat: Singapore; Banka; Nias; Sumatra (Telok betong, Tandjong, Benkulen, Trussan, Padang, Tiku); Java (Batavia, Tandjong Priok!, Tjilatjap!, Banjuwangi, Japara); Bali; Flores!; Borneo (Sambas, Kota baru!, Singkawang, Sungi Duri, Sampit, Kahajan, Bandjermassin, Balikpapan!, Upper Riko-river!); Celebes (Makassar, Bonthain, Bulucomba, Badjoa, Lagussi, Pampanuwa, Tanawanko); Buton!; Buru; Ambon; Ceram; Batjan; Ternate; Halmahera; Aru Islands; Mysore; Normanby Island near New Guinea. — Red Sea, Beira!, Zanzibar, Natal coast, Delagoa Bay, Chinde, Madagascar, Bourbon, Mauritius, Muscat, Coasts of British India, Chilka Lake, Ceylon!, Siam, Bangkok, Formosa, Riu Kiu Islands, Philippines, Marianas, Australia (Port Darwin, Queensland, Clevelands Bay), Solomon Islands, New Caledonia, Samoa, Fidji Islands. — In sea, brackish water, rivers. The commonest species in the Archipelago, where it is much used as a common food fish.

6. **Leiognathus splendens** (Cuv.).

Equula splendens Cuvier, Règne Anim. edit. 2a, II. 1829, p. 212.
Equula gomorah Cuvier & Valenciennes, Hist. Nat. Poiss. X. 1835, p. 80.
Equula gomorah Rüppell, Neue Wirbelt. Fische 1835—40, p. 51.
Equula gomorah Bleeker, Nat. & Geneesk. Arch. Ned. Ind (3) II. 1845, p. 518.
? *Equula caballa* Bleeker, Fauna Midd. en Oost-Java, p. 9, Verh. Bat. Gen. XXIII. 1850, (fide l. c. XXIV. 1852, p. 82). [nec C. V.].
Equula splendens Cantor, Journ. Asiat. Soc. Bengal XVIII. 1850, p. 1131.
Equula gomorah Bleeker, Makreel. Vissch. p. 82, Verh. Batav. Gen. XXIV. 1852.
Equula splendens Günther, Cat. Brit. Mus. II. 1860, p. 501.
Leiognathus gomorah Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 235.
Leiognathus splendens Bleeker, l. c. p. 270.
Equula splendens Kner, Novara-Exp. Fische, 1865—67, p. 168.

Equula splendens Day, Fish. India 4°, 1878—88, p. 239.
Equula splendens Klunzinger, Fische Roth. Meer. 1884, p. 107.
Equula splendens Macleay, Proc. Linn. Soc. N. S. Wales IX. 1884, p. 25.
Eubleekeria (*Leiognathus*) *splendens* Fowler, Journ. Acad. Nat. Sc. Philadelphia (2) XII. 1904, p. 516.
Leiognathus splendens Evermann & Seale, Bull. Bur. Fish. XXVI, (1906) 1907, p. 67.
Leiognathus splendens Seale, Philippine Journ. Sc. V. 1910, p. 273.
Equula splendens M. Weber, Siboga-Exp. Fische, 1913, p. 267.
Equula splendens de Beaufort, Bijdr. Dierk. Leiden, 1913, p. 120.
Leiognathus equula Fowler & Bean, Proc. U. S. Nat. Mus. LXII. 1922, p. 22 (nec Forskål)[1].

D. VII. 17; VIII. 16; A. III. 14.

Oblong, compressed; dorsal profile much more convex than ventral; height about 1.75, head about 3 in length; the fronto-occipital profile concave, the supraoccipital concavity twice as long as broad; nuchal spine longer than eye, keeled. Eye 2.50 in head, nearly equal to interorbital space, longer than obtuse snout. A pair of spines above frontborder of eye, border of eye behind them denticulate. Commencement of gape of mouth below lower margin of eye; mouth when protracted slightly directed downwards; maxillary reaches vertical through middle of eye; mandible somewhat concave. Praeoperculum with obtuse angle, its lower margin concave, more or less strongly serrated. Minute teeth in jaws in a single series. Scales middle-sized, easily rubbed of, wanting only on head; on breast fully and distinctly present; lateral line less convex than dorsal profile, with about 55 sensory tubes, terminating at base of caudal[2]. Dorsal spines rather strong, the second little shorter than half height of body; the second and third dorsal and anal spines and the fourth dorsal anteriorly denticulated in their lower part. Pectorals shorter than head, ventrals much shorter, with a strong spine and a long axillary scale-like process. Caudal deeply emarginate. Colour silvery, end of snout dotted with black, axil of pectorals black, membrane between second to sixth dorsal spine superiorly black, forming a spot which may be wanting. Length up to 140 mm. [Specimen of BLEEKER's collection in the Amsterdam Museum seen by us].

Nom. indig.: Peperrek (Malay. Batavia); Pettah (Javan. Samarang); Dodok (Surabaya); Gempar (Pasuruan).

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[1] This determination must be erroneous as the authors say that the scales „entirely cover chest"; they describe also the black patch on spinous dorsal, characteristic for *L. splendens*.

[2] The caudal tubes are sometimes lost.

Habitat: Sea of Penang; Singapore; Banka; Nias!; Sumatra (Benkulen, Padang, Priaman, Siboga); Java (Batavia!, Tandjong Priok!, Japara, Rembang, Surabaya, Pasuruan); Madura; Bawean; Bali; Lombok!; Sumbawa; Borneo (Sandakan, Kota baru!, Balikpapan!); Celebes (Makassar, Menado!, Bulucomba); Batjan; Ternate!; Ambon!; Buru; Ceram; Obi major!; Aru Islands; Timor. — Red sea, Madagascar, Mauritius, British India, Ceylon, Andamans, Siam, China, Formosa, Philippines, Queensland, Fidji Islands. — In sea, entering rivers; a common food fish in the Archipelago.

7. **Leiognathus dussumieri** (C. V.) [Fig. 67, p. 312].

Equula dussumieri Cuvier & Valenciennes, Hist. nat. Poiss. X. 1835, p. 77.
Equula Dussumieri Bleeker, Bengalen, Verh. Batav. Gen. XXV. 1853, p. 46 (name only).
Equula dussumieri Günther, Cat. Brit. Mus. II. 1860, p. 500.
Equula dussumieri Kner, Novara-Exp. Fische 1865—67, p. 167.
Equula dussumieri Playfair, Proc. Zool. Soc. London 1868, p. 10.
Leiognathus Dussumieri Bleeker, Poiss. Madagascar 1875, p. 98 (name only).
Equula dussumieri Day, Fishes India 4°, 1878—1888, p. 239.
Equula dussumieri Günther, Challenger Exp. Zool. VI. 1880, p. 52 (name only).
Equula Dussumieri Sauvage, Poiss. Madagascar, 1891, p. 518.
Equula dussumieri M. Weber, Zool. Ergebn. Reise Nied. Ost-Indien Hft. 2, 1894, p. 409.
? *Leiognathus ensiferus* Jordan & Richardson, Bull. Bur. Fish. XXVII. (1907) 1908, p. 252 (nec C. V.).
Leiognathus dussumieri Seale & Bean, Proc. U. S. Nat. Mus. XXXIII. 1908, p. 242.
Equula Dussumieri Pellegrin, Bull. Soc. Zool. XXXIX. 1914, p. 225.
Liognathus dussumieri Regan, Ann. Mag. Nat. Hist. (9) V. 1920, p. 420.
Leiognathus dussumieri Fowler, Mem. Bern. P. Bish. Mus. X. 1928, p. 153.

D. VIII. 16; A. III. 14.

Moderately compressed, dorsal profile more convex than ventral, strongly elevated and curved behind occiput. Height 1.8—1.9 [2.2—2.3 with caudal] in length; head 3.4—3.7 [4—4.2]. Eye 3 in head; in young shorter, in old specimens about equal to blunt snout, somewhat shorter than interorbital space, which shows a rhombic concavity, longer than broad, between the two smooth supraorbital ridges, each of which commences at the inner supraorbital spine; they converge posteriorly and are continued as outer borders of the crested nuchal spine, which is much longer than diameter of eye and curved according to curvature of back. Two rather strong spines above frontborder of eye. Commencement of gape of mouth below lower margin of eye; mouth when protracted, directed downwards; maxillary surpassing the vertical through frontborder of eye;

mandible slightly concave. Praeoperculum with obtuse angle, its lower margin finely serrated. Teeth in a single series in jaws. Scales small, conspicuous, also on breast fully and conspicuously developed; on anterior part of body somewhat smaller than those of posterior part. Lateral line commencing with a concavity, than curved somewhat upwards and running, less convex than dorsal profile, to base of caudal, with about 60 sensory tubes. Second dorsal spine shorter than half height of body; the following spines rapidly decreasing in size, the third and fourth strongly serrated anteriorly at their base; second anal spine stronger, but conspicuously shorter than second dorsal, the third anal spine anteriorly strongly serrated at its base. Basal sheath of both fins, with hardly prominent blunt spines. Pectorals slightly longer than head without snout; ventrals nearly one third shorter, reaching anal, with a strong spine and a large scale-like axillary process. Caudal emarginate with rounded lobes. Colour in alcohol yellowish brown above, lighter below, fresh specimens silvery with grayish back with faint, dark vertical bands. Length up to 180 mm.

Habitat: Singapore; Celebes (River Minralang!, Lake of Sidenreng!). — Madagascar, British India, Andamans, Philippines, Tahiti [Kner]. In sea and fresh water of rivers and lakes.

Note: This species has most likely a wider distribution in the Archipelago, but is probably often confounded with *Leiognathus equulus* (Forsk.) or *L. fasciatus* Lac. from which it is readily distinguished by the kind of squamation of the breast, a point overlooked by the authors. Kner tried to explain the fact that Bleeker did not know *L. dussumieri* from the Archipelago by supposing that it was concealed under *Equula gerreoides* Blkr. But this can not be the case, as *gerreoides* has a totally different profile of the head, has a straight mandible, other measure of height and a different squamation. After our opinion *gerreoides* Blkr. is a synonym of *L. daura* (Cuv.).

8. **Leiognathus leuciscus** (Gthr.).

Equula leuciscus Günther, Cat. Brit. Mus. II 1860. p. 503.
Leiognathus leuciscus Bleeker, Ned. Tijdschr. Dierk. II. 1865, p. 290 (name only).
Equula leuciscus Meyer, An. Soc. Esp. Hist. Nat. XIV. 1885, p. 26.
Leiognathus leuciscus Jordan & Seale, Proc. U. S. Nat. Mus. XXVIII. 1905, p. 777 (name only).
Leiognathus leuciscus Fowler & Bean, Proc. U.S. Nat. Mus. LXII. 1922, p. 23.

D. VIII. 16; A. III. 14.

Rather oblong, its height three times in total length ($2^3/_4$ to $2^4/_5$ without caudal), head $4^4/_5$ in total ($3^1/_2$ to $3^5/_6$ without caudal). Dorsal profile somewhat more convex than ventral. Eye thrice in head, equal to snout, which is somewhat produced; obtusely conical, both its profiles straight, the lower being more oblique. The width of the interorbital space equals the length of the eye. The groove between the orbits is broadest anteriorly, and becomes narrower posteriorly; it is $1^1/_2$ as long as wide. There are no spines above the eye. The angle of the praeoperculum is somewhat obtuse, the lower limb having an oblique direction, its lower margin very indistinctly serrated. Scales small, cycloid and deciduous; lateral line slightly curved, and continued to caudal fin. The dorsal fin begins immediately behind the vertical from the base of the ventrals; the second spine is very long, filiform, and extends beyond the middle of the soft portion; the third spine also is elongate, but only one-half the length of the preceding. The caudal is forked, and its length is one-fifth of the total. The anal commences vertically below the eighth dorsal spine; its second spine is flexible, and less than one-half the length of the second of the dorsal. The pectoral is short, obtusely pointed; its length is one-eighth of the total. The ventral is inserted behind the pectoral, and is composed of a rather stout spine and five rays; its length is contained ten times and a half in the total.

Colour silvery, back dotted with brownish, upper jaw brown; axil of pectoral minutely dotted with black. Length 135 mm. [After Günther, not seen by us].

Habitat: Ambon. — Formosa, Philippines.

9. **Leiognathus blochi** (C. V.)

Equula Blochii Cuvier & Valenciennes, Hist. nat. Poiss. X. 1835, p. 84.
Zeus notatus Bloch, MS. Cuvier & Valenciennes, ibidem.
Equula Blochii Bleeker, Nalez. Ichth. Fauna Bengalen, p. 46. Verh. Batav. Gen. XXV. 1853 (name only).
Equula blochii Day, Fishes of India 4°, 1878—1888, p. 241.
? *Leiognathus* (*Eubleekeria*) *spilotus* Fowler, Journ. Acad. Nat. Sci. Philadelphia (2) XII. 1904, p. 516.
Leiognathus blochii Seale, Philippine Journal Sc. V. 1910, p. 273.
Leiognathus blochii Chaudhuri, Mem. Ind. Mus. V. 1923, p. 732.

B. v, D. $\frac{8}{16}$, P. 18, V. $^1/_5$, A. $\frac{3}{14}$, C. 17.

Length of head $4^1/_3$, of caudal $4^3/_4$ to 5, height of body $2^3/_4$

to $3^1/_4$ in the total length. Eyes — diameter $^1/_3$ length of head, 1 diameter from end of snout, from $^3/_4$ to 1 apart. Dorsal profile rather more convex than that of the abdomen, a slight concavity over the occiput, the snout is rather pointed and not truncated. Upper surface of orbit serrated, which serrations appear to become obsolete in some old specimens: a pair of small spines at its anterior-superior angle, the distance between the outer edges of the supraorbital spines equals $^2/_5$ of the length of the head. The posterior margin of the maxilla reaches to below the first third or middle of the eye. Lower edge of preopercle strongly serrated. Cavity on upper surface of head at least twice as long as wide. Teeth — in a single row in the jaws. Fins — dorsal spines of moderate strength, the second rather the longest, and equal or nearly equal, to $^1/_2$ the height of the body, the third and fourth serrated anteriorly in their lower halves. Pectoral as long as the head excluding the snout. Ventral reaches to the anal. Second anal spine $2^1/_4$ in the height of the body: the third finely serrated anteriorly. Scales on body (except base of pectoral fin), breast, and chest 1): a rather large one at base of ventral. Lateral line — in about 60 tubes, situated on rounded scales. Colours — silvery, with a dark brown blotch over the nape, and a black mark in the upper half of the spinous dorsal fin from the third to the sixth spines. Vertical zig-zag yellow lines on the back and sides, which fade soon after death: base of pectoral posteriorly dark coloured. [Description after Day].

Habitat: Borneo (Sandakan). — Philippines, Bombay, Malabar, Madras, Calcutta, Akyab, Sunderbunds, Chilka Lake.

Note: We quote this species, known from the costal and estuarine water of British India, on the authority of Seale (l. s. c.) who describes it from Borneo and calls it „a common foodfish of Borneo; also recorded from the Philippines." This is a rather striking assertion, supposing that his determination was correct, as Bleeker did not know the species from the Archipelago, and we lack it in our collections from Borneo.

Fowler (l.s.c.) writes about his *Leiognathus spilotus*, described

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1) By the kindness of Lt. Col. R. B. Seymour Sewell, Director of the Zoological Survey of India, we had occasion to see an original specimen of Day's collection of *Leiognathus blochii* and could convince ourselfs that the breast and chest are covered with normal scales.

after a single specimen of $1^5/_{16}$ inch: „This may prove to be the young of *Leiognathus blochii* (Valenciennes). An indistinct brown saddle-like blotch in front of spinous dorsal on the back. Day's description and figure of *Equula blochii* differ in the posterior dark-colored base of pectoral."

10. **Leiognathus brevirostris** (C. V. [Day])[1].

Equula brevirostris Cuvier & Valenciennes, Hist. nat. Poiss. X. 1835, p. 83.
Equula brevirostris Day, Fish. India 4°, 1878—88, p. 241. — Fauna Brit. India, Fish. II. 1889, p. 190.

B. v, D. $\frac{8}{16}$, P. 18, V. $^1/_5$, A. $\frac{3}{14}$, C. 17.

Length of head $4^1/_3$, of caudal $4^1/_3$, height of body $2^2/_3$ in the total length. *Eyes* — diameter nearly $2^3/_4$ in length of head, $^3/_4$ of a diameter from end of snout, and 1 apart. Body oval, dorsal and abdominal profiles equally convex: snout pointed, not obtuse except just at its anterior extremity. Interorbital cavity nearly twice as long as broad. A pair of well developed spines at the anterior-superior angle of the eye; supraorbital edge finely serrated. The distance from the external sides of the bases of the orbital spines equals $^1/_2$ the length of the head. The maxilla reaches to below the first third of the eye: lower jaw very concave inferiorly. Lower limb of preopercle finely serrated. *Teeth* — in a single fine row in either jaw. *Fins* — dorsal spines moderately strong and compressed, the second equals $^4/_9$ (sometimes $^1/_3$) of the height of the body: the third is strongly serrated in its lower half, whilst the fourth is in its lower fourth. Pectoral as long as the head excluding the snout. Ventral reaches $^2/_3$ of way to the anal. Second anal spine $^2/_5$ of height of body, the third is strongly serrated in its lower half. Caudal forked. Free portion of tail as high at its base as it is long. *Scales* — extended over body, but not on breast or chest. *Lateral line* — in from 58 to 64 distinct tubes and not quite reaching to the base of the caudal fin. *Colours* — an oval black blotch on the upper half of the spinous dorsal fin, from the third to the seventh spines (it is sometimes very faint), and a dark brown transverse blotch across the nape of the neck. Pectoral posteriorly black at its base. A narrow yellow band passes from above the eye to the centre of the base of the caudal fin.

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[1] Bleeker has quoted this species repeatedly from the Archipelago in: Nat. & Geneesk. Arch. Ned. Ind. II. 1845, p. 518. — Madura p. 5, Verh. Batav. Gen. XXII. 1849. — Midden- & Oost-Java p. 9, o. c. XXIII. 1850, but without description. These quotations were erroneus as he stated himself in his Nalez. Bengalen & Hindostan p. 46, Verh. Batav. Gen. XXV. 1853, where he replaces them by *E. dacer* C. V. = *daura* C. V.

There are two Indian *Equula's* (? species) very similar, the one described above, *E. brevirostris*, which is destitute of scales on the breast and chest, but which is otherwise similar to the second or *E. Blochii*. The latter was described from a stuffed specimen still at Berlin, and they may prove to be varieties of the same species.

E. nuchalis, Tem. and Schleg. is very similar, but the dorsal and anal spines appear to be usually shorter, but this again is subject to considerable variation. Dr. Hubrecht at Leyden having kindly examined the type, observes that the breast and chest are apparently scaleless: still microscopic scales may perhaps exist partly hidden in the integument. [After Day].

Habitat: Borneo (Kota Baru !, Balikpapan Bay !). — Coast of British India, seas of India to China.

Note: By the kindness of Lt. Col. Seymour Sewell, Director, Zoological Survey of India, we received a specimen of *L. brevirostris* of Day's collection, which has indeed, in accordance with Day's description, the breast and chest destitute of scales, but which is otherwise similar to *E. Blochi* C. V. We preferred to reproduce the description of Day, based on specimens of at least 112 mm. length, while the specimens we have in our collection from the Archipelago are rather young not exceeding 75 mm. length.

They agree very well with Day's description. All have the breast destitute of scales; the black patch across the nape is more or less prominent, as also a black streak across the snout; the oval black blotch on the upper half of the spinous dorsal is more or less pronounced; two specimens of about 47 mm. and a larger one of 75 mm. show a narrow yellow band from above eye to base of caudal.

11. **Leiognathus smithursti** (Rams. & Ogilby).

Equula smithursti Ramsay & Ogilby, Proc. Linn. Soc. N. S. Wales (2) I. 1886, p. 11.
Leiognathus smithursti Jordan & Dickerson, Proc. U. S. Nat. Mus. Washington XXXIV. 1908, p. 610.
Leiognathus smithursti Fowler, Fish. Oceania, Mem. Bern. P. Bish. Mus. X. 1928, p. 153.

„D. $^8/_{16}$: A. $^3/_{14}$: V. $^1/_5$: P. 20; C. 19.

Length of head $4^1/_6$, of caudal fin $4^1/_6$, height of body $2^2/_5$ in the total length. Diameter of eye $^1/_3$ of the length of the head, equal to that of the snout, and also to the interorbital space. Dorsal profile much more convex than the abdominal; upper jaw very protractile, the length of the hinder limb being $7^1/_3$ in the total length; interorbital cavity lanceolate, twice as long as broad. Supraorbital edge smooth; two small spines above the antero-superior angle of the eye, the inner one being the weaker, and placed further forward. Lower limb of the preopercle minutely serrated. Teeth small, closely set, in numerous rows. Dorsal spines weak, the first minute, the second greatly elongated, more than half the total length of the body, the fourth serrated at the base: second anal spine elongate, as long as the head: pectorals about equal to the distance between the snout and the hind margin of the eye: caudal forked. Scales minute, none on the chest or breast. Lateral line consists of 62 tubes, and ceases a short distance in front of the caudal fin. Colors, silvery, washed with blue on the back; sides of the head tinged with gold: snout, and a band from the upper angle of the eye to the opercle, black". [Description after Ramsay & Ogilby, not seen by us].

Habitat: New Guinea (Hood Lagune). — Fiji.

12. **Leiognathus daura** (Cuv.).

Equula daura Cuvier, Règne Anim. II. 1829, p. 212.

Equula dacer Cuvier & Valenciennes, Hist. nat. Poiss. X. 1835, p. 83.

Equula brevirostris Bleeker, Nat. & Geneesk. Arch. Ned. Indië (3) II. 1845, p. 518 (nec C. V. fide Bleeker).

Equula daura Cantor, Journ. Asiat. Soc. Bengal XVIII. 1850, p. 1132.

Equula gerreoides Bleeker, Nat. Tijdschr. Ned. Indië I. 1851, p. 371. — Makreel. Vissch., p. 81, Verh. Batav. Gen. XXIV. 1852.

Equula dacer Nat. Tijdschr. Ned. Indië III. 1852 p. 57. — Makreel. Vissch. Verh. Batav. Gen. XXIV. 1852, p. 81.

Equula daura Günther, Cat. Brit. Mus. II. 1860, p. 502.

Leiognathus gerreoides Bleeker, Ned. Tijdschr. Dierk. II. 1865, p. 174 (name only).

Equula gerreoides Day, Proc. Zool. Soc. London 1870 p. 960 (name only).

Equula daura Day, Fish. India 4°, 1878—88, p. 240.

? *Equula gerreoides* de Vis, Proc. Linn. Soc. N. S. Wales IX. 1884. p. 545.

Equula daura Steindachner, Denkschr. Akad. Wien. LXXI. 1902. p. 144.

Leiognathus gerreoides Bean & Weed, Proc. U. S. Nat. Mus. XLII. 1912. p. 604 (name only).

Equula daura de Beaufort, Bijdr. Dierk. Leiden, 1913, p. 120.

Leiognathus daura Jordan & Starks, Ann. Carnegie Mus. XI. 1917, p. 444.

D. VIII 16; A. III 14—15.

Oblong, compressed; dorsal profile slightly more convex than ventral, height 2.2 in length [2.8 with caudal]; head 3.3 [4.2 with caudal], pointed; rostro-occipital profile ascending in a nearly straight line, with a slight concavity above eyes; dorsal profile behind nape more convex till spinous dorsal. Eye about thrice in head, equal to or slightly longer than blunt snout and equal to interorbital space, which has a triangular undeep depression bordered by the smooth supraorbital ridges, continued as outer borders of the nuchal spine, the length of which surpasses considerably the diameter of the eye. The postnasal spines nearly inconspicuous. Lips thick, commencement of gape of mouth opposite lower third of eye; mandible nearly not concave; maxillary terminating below frontborder of eye; mouth, when protracted, directed downwards. Praeoperculum with an obtuse angle, its lower border minutely denticulated. Gillrakers 15—16 on lower branch of first branchial arch, very short, the longest about 6 times in eye-diameter. Minute teeth in a single series in jaws. Scales minute, wanting on head and breast; lateral line much less convex than dorsal profile, with short sensory tubes, terminating below end of dorsal, individually followed by some obsolete ones on caudal peduncle. Second dorsal nearly half height of body, the following spines diminishing quickly in length; second anal spine rather strong, much shorter, its length less than length of head without snout. Pectorals broad, equal to length of head without snout. Ventrals about $^2/_3$ of pectorals, with a strong spine and large axillary scale, not reaching anal. Caudal deeply emarginate. Colour silvery, dorsally greyish, with a yellowish lateral band from eye to caudal, a blackish rostral band, a black patch on pectoral axil and a black patch between upper part of second to fifth or sixth dorsal spine, other fins hyaline, a black line running along base of soft dorsal. Length up to 110 mm. [Specimen of BLEEKER's collection in the Amsterdam Museum seen by us].

Nom. indig.: Peperrek (Malay. Batavia); Pettah (Javan. Samarang); Petek (Patjitan); Gempar (Pasuruan).

Habitat: Sea of Penang; Singapore; Sumatra (Benkulen); Banka; Java (Batavia, Cheribon, Tegal, Samarang, Japara, Patjitan, Rembang, Pasuruan); Madura; Borneo (Pamangkat, Kota Baru!); Buton!; Ambon!. — South Arabia, British India, Ceylon, Andamans, Siam, Queensland.

Note: After comparing *L. daura* with two specimens of *Equula gerreoides* Blkr. from Bleeker's collection in the Amsterdam Museum, though they are in bad state of preservation, we can not distinguish them from *daura* and come to the conclusion, that they belong to that species. It is true, that *daura* has a black spot between the second and sixth dorsal spine, while Bleeker describes *gerreoides* as having: „dorsali spinosa apicem versus fuscescente vel aurantiaca", but the black spot of *daura* may fade, as is also known from *Leiognathus splendens* Cuv. Bleeker says about that species, that dayly thousands of it arrive on the market of Batavia, but that the black patch on the spinous dorsal is wanting in the majority of the specimens, so that it is not sufficient to recognize the species.

13. **Leiognathus bindus** (C. V.)

Equula bindus Cuvier & Valenciennes, Hist. nat. Poiss. X. 1835, p. 78.
Equula bindus Cantor, Journ. Asiat. Soc. Bengal XVIII. 1850, p. 1130.
Equula bindoides Bleeker, Nat. Tijdschr. Ned. Indië I. 1851, p. 372. — Makreel. Vissch., p. 83, Verh. Batav. Gen. XXIV. 1852.
Equula bindus Günther, Cat. Brit. Mus. II. 1860, p. 501.
Equula bindus Bleeker, Versl. Akad. Amsterdam XII. 1861, p. 75.
Equula bindoides Kner, Novara-Exp. Fische 1865—67, p. 168.
Equula bindus Day, Fish. India 4°, 1878—88, p. 240.
Leiognathus virgatus Fowler, Journ. Acad. Nat. Sc. Philadelphia XII. 1904, p. 515.
Equula bindus M. Weber, Siboga-Exp. Fische 1913, p. 268.

D. VIII. 16—17; A. III. 14.

Compressed, oblong, anteriorly ovate. Abdomen before anal trenchant, with age increasingly more convex than opposite dorsal profile; from anal to caudal peduncle much less convex; dorsal profile in its rostro-frontal part ascending with a slightly concave line, behind occiput somewhat elevated, thence from spinous dorsal to caudal peduncle slightly convex, similar to opposite ventral profile. Height about 2 in length [2.5 in length with caudal]. Head 3.5 [4.3] in length; somewhat pointed. Eye nearly thrice in head, longer than blunt snout and about equal to interorbital space, which forms an undeep triangular concavity bordered by the smooth supraorbital ridges, continued as outer borders of the nuchal spine. This triangular spine is conspicuously grooved, has a median keel and is much longer than diameter of eye. Two more or less conspicuous spines above anterior border of eye; the upper rim of orbit behind them finely crenulated. Lower preopercular margin serrated. Commencement of gape of mouth somewhat above level of lower border of eye. Mandible almost straight. Mouth, when protracted, only slightly directed downwärds. Minute teeth in a single series in jaws. Scales elliptical, small but conspicuous, covering the whole body, except head; lateral line less convex than dorsal profile, the sensory tubes conspicuous till about behind spinous dorsal, thence diminishing in size and regularity and terminating before end of dorsal. Second dorsal spine the longest, rather strong, somewhat curved, its length about twice in height of body; the following spines gradually decreasing in size. Second anal spine rather stronger but much shorter. Basal sheath of both fins with low interradial spines. Pectorals about equal to head without snout; ventrals equal to eye, with a long axillary scale. Caudal with spreading, pointed lobes. Colour silvery, back brownish with dark irregular, somewhat vermiculate more or less conspicuous markings; snout brown, spinous dorsal in its upper third with an orange spot, inferiorly edged with black. Length up to more than 80 mm. [Specimen of BLEEKER's collection in the Amsterdam Museum seen by us].

Nom. indig.: Peperrek (Malay. Batavia).

Habitat: Sea of Penang; Singapore; Sumatra (Padang); Banka; Java (Batavia, Tandjong Priok!, Patjitan); Lombok!; Sumbawa; Borneo (Kota baru!); Celebes (Bulucomba, Badjoa, Menado!); Buton!. — British India, Ceylon, China [Karoli]; Formosa, Philippines.

Note: Fowler (l. s. c.) writes, that his *L. virgatus* is related to *L. bindoides* Blkr., differing in the black bar on dorsal, preocular spines more obsolete, and absence of golden spots on spinous dorsal. The degree of obsoleteness of the always small supraocular spines is only to state by comparing the specimens themself and besides that usually a question of age. Bleeker, in describing the colour of *L. bindoides* = *bindus* C. V., does not speak of golden spots. He says „dorsali spinosa apice macula pulchre aurantiaca fusco cincta", the same as Kner and Day describe it. In well preserved specimens the orange spot is inferiorly black or brown edged, forming „a blackish cross-bar a little below centre of height of spinous dorsal" as Fowler describes, but is wanting on his figure.

14. Leiognathus berbis (C. V.).

Scomber equula var. b. Forskål, Descr. Animal. 1775, p. 85.
Equula berbis Cuvier & Valenciennes, Hist. nat. Poiss. X. 1835, p. 85.
Equula oblonga Cuvier & Valenciennes, ibidem.
Equula oblonga Bleeker, Makreel. Visschen, p. 84, Verh. Batav. Gen. XXIV. 1852.
Equula gracilis Bleeker, Nat. Tijdschr. Ned. Indië VII. 1854, p. 249 (juv.).
Equula oblonga Günther, Cat. Brit. Mus. II. 1860, p. 502.
Leiognathus oblongus Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 270.
Equula oblonga Day, Fish. Malabar 1865, p. 106.
Equula oblonga Klunzinger, Abh. Zool. botan. Ges. Wien. XXI. 1871, p. 467.
Equula oblonga Day, Fish. India 4°, 1878—1888, p. 243.
Equula berbis Klunzinger, Fische Roth. Meer., 1884, p. 107.
Equula oblonga M. Weber, Siboga-Exp. Fische 1913, p. 268.
Equula oblonga de Beaufort, Bijdr. Dierk. Leiden 1913, p. 120.
Leiognathus berbis Fowler, Mem. Bern. P. Bish. Mus. X. 1928, p. 153.

D. VIII. 15—16; A. III. 14.

Not much compressed, elongate, elliptical, dorsal and ventral profile nearly equally convex, back not elevated. The height relatively strongly increasing with growth, in young 3.7 [4.2], in old specimens 2.3 in length, 2.85 in length with caudal. Head 3.7 [4.2], in old 3.5 [4.4] in length, pointed, its rostro-occipital profile ascending in a nearly straight line and continued without interorbital or occipital concavity in the profile of back. Eye about thrice in head, almost equal to interorbital space and to somewhat pointed snout, with thick lips. Orbital rim smooth. Interorbital space bordered on each side by the smooth oblique supraorbital ridges, which are continued as outer borders of the triangular nuchal spine. The enclosed interorbital space is slightly depressed and crossed by a longitudinal ridge, ending level with the hindborder of the eye. After an interspace it is continued as median ridge of the nuchal spine, which is slightly longer than diameter of eye. Two small approximate spines behind nostrils, getting nearly obsolete in old age. Praeoperculum with rounded angle, its lower margin straight, finely serrated. Snout, when protracted, directed downwards. Mandibula nearly not concave, ascending with an angle of 35° at most; maxillary reaching below frontborder of eye or somewhat behind it. Commencement of gape of mouth opposite lower half of eye. Teeth minute, in a single series in jaws. Scales of rather medium size, deciduous, not wanting on breast; lateral line terminating near end of dorsal or slightly behind it. Dorsal spines slender, the second, third and fourth subequal; the second equal to or, in adult, longer than half height of body, the second small spine nearly half that height. Pectorals about equal to length of head, without snout, longer than ventrals. Caudal emarginate, the lobes somewhat acute. Colour, in alcohol, silvery, back gray or more or less yellowish-brown, with irregular dark spots and rather broad more or less angulated lines, some serially arranged; they easily fade in old specimens. Snout with a narrow brownish band, top of spinous dorsal with a brown marking, fins hyaline. Length up to 135 mm. [Specimens of BLEEKER's collection in the Amsterdam Museum seen by us].

Nom. indig.: Peperrek (Malay. Batavia).

Habitat: Penang; Singapore; Java (Batavia); Bali; Celebes (Makassar!, Menado, Bulucomba, Bonthain, Badjoa); Saleyer!; Timor; Ceram!; Ambon. — Red Sea, Zanzibar, British India, Bangkok (v. Martens), Nangasaki (v. Martens).

15. **Leiognathus lineolatus** (C. V.).

Equula lineolata Cuvier & Valenciennes, Hist. nat. Poiss. X. 1835, p. 86.
Equula lineolata Bleeker, Makreel. Vissch. p. 83, Verh. Batav. Gen. XXIV. 1852.
Equula lineolata Günther, Cat. Brit. Mus. II. 1860, p. 502.
Leiognathus lineolatus Bleeker, Ned. Tijdschr. Dierk. II. 1865, p. 290 (name only).
? *Equula lineolatus* Day, Fish. India 4°, 1878—88, p. 241.
Equula lineolata De Vis, Proc. Linn. Soc. N. S. Wales IX. 1884, p. 545.
Equula lineolata Nyström, Bihang Akad. Stockholm XIII. 1887, p. 36.
Equula lineolata Perugia, Ann. Mus. Civ. Genova (2) VII. 1889, p. 274 (name only).
? *Leiognathus vermiculatus* Fowler, Journ. Acad. Sc. Philadelphia XII. 1904, p. 513.
Equula lineolata M. Weber, Siboga-Exp. Fische 1913, p. 268.
Leiognathus lineolatum Jordan, Tanaka & Snyder, Journ. Coll. Sc. Univ. Tokyo XXXIII. 1913, p. 131 (name only).

D. VIII. 16; A. III. 14.

Compressed, oblong, dorsal and ventral profile equally convex, rostro-occipital profile ascending in a straight line with a slight frontal concavity, thence dorsal profile with a slight nuchal elevation. Height 2.46 to 3.0 [3.0—3.6 with caudal], head pointed, 3.4—3.7 [3.9—4.5 with caudal] in length. Eye 2.5—3 in head, equal to interorbital space and equal to or somewhat shorter than snout. Interorbital space bordered on each side by a smooth supraorbital ridge, continued as outer border of nuchal spine, which is longer than eye; interorbital space concave with a median ridge, in large specimens nuchal spine with a conspicuous median ridge; a pair of postnasal spines, the outer spine conspicuous, directed hindwards. Snout when protracted strongly directed downwards, longer than half length of head. Commencement of gape of mouth opposite lower third of eye. Praeoperculum with rounded angle, its lower margin straight, minutely denticulate. Teeth minute in a single series in jaws. Scales relatively of medium size, conspicuous, adherent, covering also the breast; lateral line much less convex than dorsal profile, terminating before end of dorsal. Dorsal spines slender, the second to fourth subequal, the second about half height of body, longer than second anal which is shorter than head. Pectorals about equal to head without snout. Ventrals two-third of that length. Caudal deeply incised, the lobes acute. Colour silvery, back grayish or violaceous with dark irregular spots; snout brown, fins hyaline. Length up to 98 mm. [Specimens of BLEEKER's collection in the Amsterdam Museum seen by us].

Nom. indig.: Peperrek (Malay. Batavia).

Habitat: Singapore; Banka; Nias; Sumatra (Padang, Priaman); Java (Batavia, Anjer, Banjuwangi); Lombok!; Celebes (Makassar); Ambon. — Suez Canal (? J. R. NORMAN 1929), British India, Madagascar, Japan, Queensland. In sea.

2. **Gazza** Rüppell.

(Rüppell, Neue Wirbelth. Fische, 1835, p. 3).

More or less compressed, oblong or elevated, dorsal and ventral profile nearly equally convex. Scales very small, cycloid, wanting on head and breast, on back present but deciduous;

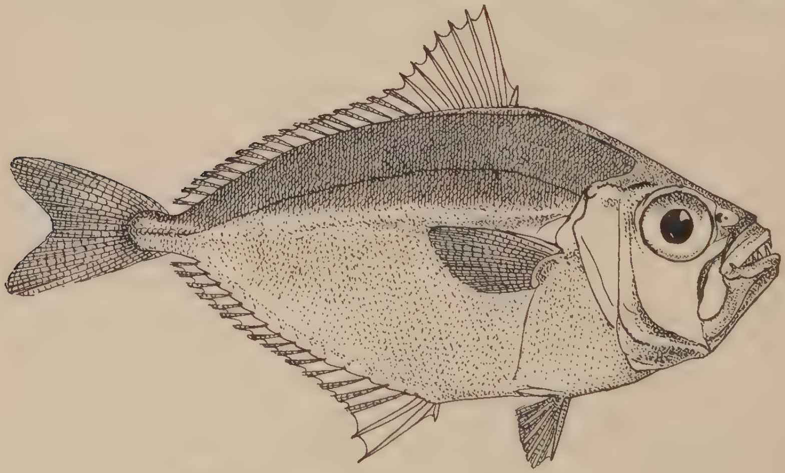

Fig. 71. *Gazza minuta* (Bl.) nat. size.

lateral line complete, with about 60 small sensory tubes. Gape of mouth oblique. Mouth very protractile, when protracted pointing horizontally, the mandibula ascending with an angle of about 45°. Head pointed with the rostro-dorsal profile straight, supraorbital ridges sometimes finely serrated, preceded by two small or obsolete post-nasal spines; praeoperculum with rounded angle, its lower margin serrated. Gillrakers 14—16 on lower part of first branchial arch. A single series of sharp teeth in upper jaw, with a curved canine of different size on each side of symphysis; in lower jaw a series of curved, pointed teeth, larger anteriorly, with a pair of symphysial canines, with a notch between them to receive the upper canines; the size of teeth changing with age and with growth of dentition. A single dorsal with VIII spines and 16 rays; anal with III spines and 14 rays; second dorsal and anal spine the longest. Pectorals short, ventrals I, 5 with an axillary scale-like process. Caudal deeply emarginate. For other characters see those of the family.

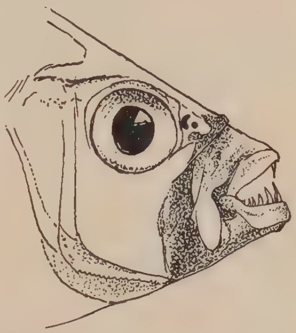

Fig. 72. Head of *Gazza minuta* (Bl.) showing protruded mouth, forming a horizontal tube. nat. size.

Distribution: Small marine costal fishes, living in shoals, entering brackish and fresh water. A food-fish of importance on account of its abundance throughout the Archipelago. Extending from the Red Sea, along the East Coast of Africa, over the Indian Ocean to the Philippines, North Australia to Society Islands.

1. **Gazza minuta** (Bl.) [Fig. 71, 72 p. 338, 339].

Scomber minutus Bloch, Ichthyol. 1797, tab. 429, fig. 2.
Zeus argentarius (Forster) Bloch, Schneider, Syst. Ichth. 1801, p. 96.
Gazza equulaeformis Rüppell, Neue Wirbelth. Fische 1835, p. 4.
Equula minuta Cuvier & Valenciennes, Hist. nat. Poiss. X. 1835, p. 88.
Equula dentex Cuvier & Valenciennes, l. c. p. 91.
Zeus argentarius Forster, Descr. Animal. curav. Lichtenstein, 1844, p. 288.
Gazza equuliformis Bleeker, Nat. & Geneesk. Arch. Ned. Ind. (3) II. 1845, p. 518.
Gazza equulaeformis Cantor, Journ. Asiat. Soc. Bengal XVIII. 1850, p. 1135.
Gazza minuta Bleeker, Nat. Tijdschr. Ned. Ind. II. 1851, p. 213. — Makreel. Vissch. p. 85. Verh. Batav. Gen. XXIV. 1852. — Nat. Tijdschr. Ned. Ind. IV. 1853, p. 259.

Gazza tapeinosoma Bleeker, Nat. Tijdschr. Ned. Ind. IV, 1853, p. 260.
Gazza equulaeformis Bleeker, l. c. p. 261.
Gazza argentaria Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 242 (name only).
Equula dentex Kner, Novara-Exp. Fische. 1865—67, p. 170.
Gazza argentaria Klunzinger, Abh. zool. bot. Ges. Wien. XXI. 1871, p. 467.
Gazza equulaeformis Klunzinger, l. c. p. 468.
Gazza argentaria Günther, Fische Südsee 1876. p. 144.
Gazza equulaeformis Günther, ibidem.
Leiognathus (*Gazza*) *minutus* Bleeker, Maurice, Verh. Akad. Amsterdam 1879, p. 19.
Gazza argentaria Klunzinger, Fische Roth. Meer. 1884, p. 108.
Gazza equulaeformis Klunzinger, ibidem.
Gazza minuta Day, Fish. India 4°, 1879—1888, p. 244.
Gazza equulaeformis Day, ibidem.
Gazza argentaria Day, l. c. Suppl. 1888, p. 790.
Gazza equulaeformis Jordan & Evermann, Proc. U. S. Nat. Mus. XXV. 1902, p. 338.
Gazza minuta Fowler, Journ. Acad. N. Sc. Philadelphia (2) XII. 1904, p. 517.
Gazza tapeinosoma Fowler, ibidem.
Gazza minuta Evermann & Seale, Bull. Bur. Fish. XXVI. (1906) 1907, p. 69.
Gazza tapeinosoma Evermann & Seale, ibidem.
Gazza minuta Jordan & Seale, l. c. p. 15.
Gazzae qulaeformis Gilchrist & Thompson, Ann. South. Afric. Mus. VI. 1908, p. 189.
Gazza minuta Seale, Philippine Journ. Sc. 1910, p. 272.
Gazza argentaria M. Weber, Siboga-Exp. Fische 1913, p. 270.
Gazza minuta Jordan & Starks, Ann. Carnegie Mus. XI. 1917, p. 444.
Gazza argentaria Fowler & Bean, Proc. U. S. Nat. Mus. LXII. 1923, p. 24.
Gazza minuta Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 626.
Gazza minuta Fowler, Mem. Bern. P. Bish. Mus. X. 1928, p. 154.
Gazza equulaeformis Fowler, ibid.

Height 2—2.50, head 2.75—3.50 in length. Eye 3—3.74 in head, with a narrow adipose eyelid equal to or longer than snout and interorbital space. Exposed part of maxillary about equal to diameter of eye, reaching to below frontborder of pupil. The minute scales are wanting on head and on a triangular space between pectorals and ventrals, present also on back but deciduous. Dorsal spines slender and flexible, the second somewhat longer than head without snout; second anal spine somewhat shorter but stronger. For other characters see those of the genus. Colour dusky above, silvery on sides and below; often with fine dark points sometimes restricted to the back, which may show subcutaneous dark irregular blotches or wavy lines; fins hyaline, pectoral axil with a black or brownish spot. Length 150 mm. [Specimens of *Gazza argentaria* (Forst.) and of *G. equulaeformis* Rüpp. of BLEEKER's collection in the Amsterdam Museum seen by us].

Nom. indig: Peperrek (Malay. Batavia).

Habitat: Penang; Singapore; Riouw; Bintang; Banka; Biliton; Sumatra (Trussan, Priaman, Siboga, Benkulen, Telok Betong, Tiku); Nias!; Java (Batavia, Tandjong Priok!; Palabuan Ratu, Banjuwangi, Japara); Bawean; Bali; Lombok!; Sumbawa!; Borneo (Sandakan, Kota Baru!); Celebes (Bulucomba, Makassar!, Badjoa, Tombariri, Menado, Bonthain); Saleyer!; Timor; Ambon!; Ceram!; Buru; Obi major; Batjan; Ternate; Goram; Halmahera; Waigeu!; Mysore; New Guinea. — Red Sea, Zanzibar, Mossambique, Delagoa Bay, Natal Coast, Madagascar, Bourbon, Mauritius, Seychelles, British India (Coasts, Chilka Lake), Ceylon!, Andamans, Siam, Formosa, Philippines, Australia (Queensland), Solomon Isl., New Britain, Tahiti, Tanna, Rarotonga.

Note: In 1852 (l.s.c.) Bleeker recognized only one species of *Gazza*, uniting the at that time known species *Equula minuta* C. V., *E. dentex* C. V. and *Gazza equulaeformis* Rüpp. as *Gazza minuta* (C. V.). In 1853 (Nat. Tijdschr. Ned. Ind. IV. 1853, p. 259) he altered his opinion and distinguished *G. minuta* (C. V.), *G. equulaeformis* Rüpp. and a new species *G. tapeinosoma* Blkr. which afterwards was recognised by Günther to be identical with *Zeus argentarius* (Forst.) Bl. Schn. and called *G. argentaria*, a change of name admitted by Bleeker to be right. As principal distinguishing characters the height of the body, the length of the second dorsal and anal spine and the size of the canines were credited. The validity of these characters was put in doubt by Klunzinger in 1871 and again in 1884. In 1913 one of us (Siboga-Exped. Fische, 1913, p. 270) tried to show, that these characters are not of intrinsic value, to differentiate the 3 species, which therefore ought to be united. This assumption is accepted f. i. by Jordan & Starks (1917), by Barnard (1927) a. o.

3. **Gerres** Cuvier.

(Cuvier, Règne Animal ed. 2. II, 1829, p. 104).

Diapterus Ranzani, Novi Comment. Acad. Sc. Inst. Bonon. IV. 1840, p. 340.

Catochaenum Cantor, Journ. Asiat. Soc. Bengal XVIII. 1849, p. 1037.

Compressed, oblong, elevated or oval; covered with moderate scales, minutely or not ciliated or crenulated, present also on occipital, frontal and lateral part of head. Lateral line complete and continuous. No bony ridges on top of head; an interorbital naked concavity, for receiving the maxillary process. Mouth small, protractile; when protracted descending downward. Praeoperculum entire, its lower border sometimes finely denticulate. Teeth small, acute, none on vomer, palatines and tongue. Six branchiostegals; four gills; pseudobranchiae present or concealed; gillmembranes free, not united with isthmus. Lower pharyngeal bones united by mobile suture or ligament, or coossified, independent of age, forming a more or less triangular osseous plate, covered with conical or subulate teeth, the median may be larger, granular or molariform, irregular or pavement-like or there may be three or more molariform ones at the posterior border. A single dorsal, its spinous portion with IX spines, its soft portion with 10 rays, both about equally developed and with a high scaly sheath along their base, separated by a groove from the other scales. Anal with III spines, the soft portion with 7 rays, shorter than the soft dorsal, also with a high scaly basal sheath. The spines may be strongly compressed. Pectorals long, pointed; ventrals originating below or somewhat behind base of pectorals, with a spine and five rays and with a long scalelike axillary process. Caudal deeply incised with 15 branched rays.

Distribution: Marine fishes of medium size, some entering mouth of rivers; living in all tropical seas and valued as food-fish.

Note: There is no reason to separate from *Gerres*, with normally IX dorsal spines, a genus *Gerreomorpha* Jordan (Proc. U. S. Nat. Mus. XXXIII, 1908, p. 247) with X dorsal spines, as the common species of *Gerres* sometimes show, as a variable character, X spines instead of IX.

Key to the indo-australian species of Gerres.

I. Lateral line with less than 40 scales.
  1. L. l. 33—35, L. tr. 15; lower pharyngeals coossified; height 2—2.2, head 3—3.50; second dorsal spine about twice in height; distance of dorsal from end of snout equal to height of body, shorter than dorsal; pectorals reaching anal . . . . 1. *G. abbreviatus* p. 344.
  2. L.l. 35—38; lower pharyngeals united by mobile suture; distance of dorsal from end of

snout longer than height, shorter than dorsal; second dorsal spine twice in height; pectorals not reaching anal.

a. L. tr. 16; height 2.50—3, head 3—3.30; spines slender . . . . 2. *G. oyena* p. 345.

b. L.tr. 14; height about 2.50; head 3.4; spines very strong and broad. . . . . . . 3. *G. poeti* p. 347.

II. Lateral line with 40 scales; lower pharyngeals coossified.

1. L. tr. 15; height 2.37; head 3—3.2; second dorsal spine equal to head without snout, distance of dorsal from end of snout longer than height, shorter than dorsal; pectorals reaching anal. . 4. *G. kapas* p. 348.

III. Lateral line with more than 40 scales, lower pharyngeals united by mobile suture.

1. Second dorsal spine produced into a filament, distance of dorsal from end of snout equal to or shorter than height of body; pectorals reaching anal.

a. L. l. 45, l. tr. 18; height 2—2.50, head 3—3.30; second dorsal spine equal to or somewhat shorter than height of body, mandibular profile strongly concave; distance of dorsal from end of snout equal to height. 5. *G. punctatus* p. 349.

b. L. l. 42—43, l. tr. 16; height 2.25—2.80, head 3—3.5; second dorsal spine longer than height of body; distance of dorsal from end of snout shorter than height; mandibular profile nearly not concave . . 6. *G. macracanthus* p. 351.

2. Second dorsal spine without produced filament, as long as half height of body or somewhat longer; mandibular profile straight or nearly so; distance of dorsal from end of snout longer than height of body.

a. L. l. 46—48; l. tr. 16—17; height 3—$3^{1}/_{4}$, head about equal to height; second dorsal spine $1^{1}/_{4}$–$1^{1}/_{3}$ in height; pectorals reaching anal. 7. *G. oblongus* p. 352.

b. L. l. 42—45, l. tr. 15—17.

α. L. l. 42, l. tr. 15—16; height 2.5—3, head 3—3.5; second dorsal spine about 1.75 in height; pectorals not reaching anal 8. *G. macrosoma* p. 354.

β. L. l. 43, l. tr. 17; height 2.6—2.75; head 3.2—3.4; second dorsal spine longer than half height; pectorals reaching anal. 9. *G. acinaces* p. 355.

γ. L. l. 45–46, l. tr. 16–17; height 2.7–3; head 3.3–3.7; second dorsal spine $1^{3}/_{4}$–2 in height; pectorals not reaching anal. 10. *G. argyreus* p. 355.

Doubtful species. . . . . 11. *G. limbatus* p. 357.
12. *G. setifer* p. 358.

1. **Gerres abbreviatus** Blkr.

Gerres abbreviatus Bleeker, Maenidae, p. 11, Verh. Batav. Gen. XXIII. 1850.
Gerres abbreviatus Günther, Cat. Brit. Mus. I. 1859, p. 345; IV. 1862, p. 257.
Diapterus abbreviatus Bleeker, Ned. Tijdschr. Dierk. II. 1865, p. 279.
Gerres abbreviatus Kner, Novara-Exp. Fische 1865—67, p. 56.
Gerres abbreviatus Day, Proc. Zool. Soc. London 1870, p. 698.
Diapterus abbreviatus Bleeker, Versl. Akad. Amsterdam (2) VII. (1872) 1873, p. 248. — Atl. ichth. VIII. 1876—77, p. 127.
Gerres abbreviatus Day, Fish. India 4°, 1878—88, p. 99.
Gerres abbreviatus Günther, Challenger-Exp. Zoology VI. 1880, p. 39.
Gerres abbreviatus Macleay, Descr. Cat. Austral. Fish. I. 1881, p. 75. — Proc. Linn. Soc. N. S. Wales VII. 1882, p. 239.
Gerres abbreviatus Ramsay & Ogilby, Proc. Linn. Soc. N. S. Wales (2) I. 1886, p. 8.
Xystaema abbreviatum Jordan & Seale, Bull. Bur. Fish. Wash. XXV. (1905) 1906, p. 272.
Xystaema abbreviatum Jordan & Richardson, Mem. Carnegie Mus. IV. 1909, p. 190.
Xystaema abbreviatus Seale, Philipp. Journ. Sc. V. 1910, p. 278.
Gerres abbreviatus M. Weber, Siboga-Exp. Fische, 1913, p. 272.
Gerres abbreviatus Fowler, Fish. Oceania, Mem. Bern. P. Bishop Mus. X. 1928, p. 224.

D. IX. 10; A. III. 7; L. l. 33—35; L. tr. $\begin{array}{c}4\\\hline 1\\\hline 10\end{array}$.

Oblong, anteriorly elevated, the dorsal profile ascending strongly in a nearly straight line from snout to dorsal fin, thence descending nearly straight to caudal peduncle. Height about twice to 2.2 in length, head 3.3 to 3.50, pointed, broadened and nearly flat before eye with a small median groove in the naked interorbital space, which is slightly smaller than eye, the diameter of which goes 2.50 to 2.70 in length of head and is conspicuously longer than snout. Maxillary reaching to below pupil; mandibular profile slightly concave. Lower pharyngeal bones coossified with a double median series of large molariform teeth in pavement-like arrangement. Praeoperculum entire. No pseudobranchiae. Scales rather large, thin, with entire margin; scaly basal sheath of dorsal and anal high, including nearly totally the rays. Dorsal originates at a distance from end of snout which nearly equals height of body and is about one sixth shorter than length of spinous and soft dorsal together. Second, third and fourth dorsal spines the longest, subequal; the second twice or nearly so in height of body. Second anal spine as long as third, but much stronger, longer than postocular part of head. Pectorals much longer than head, reaching to anal; ventrals somewhat shorter than head, their axillary process moderate. Caudal peduncle high, its length equal to or not much longer than its height and about equal to half length of head. Silvery, greenish or bluish above; well preserved specimens showing diffuse, indistinct longitudinal darkish lines corresponding with the series of lateral scales. Dorsal with a black margin. Length up to 230 mm.

Nom. indig.: Kapas-Kapas (Malay.).

Habitat: Singapore; Bintang; Banka; Biliton; Sumatra (Telokbetong, Benkulen, Padang); Java (Batavia); Lombok!; Borneo; Celebes (Makassar!, Badjoa, Menado); Saleyer!; Ceram; Ambon; Waigeu; New Guinea. — British India, Andamans, Formosa, Philippines, Australia.

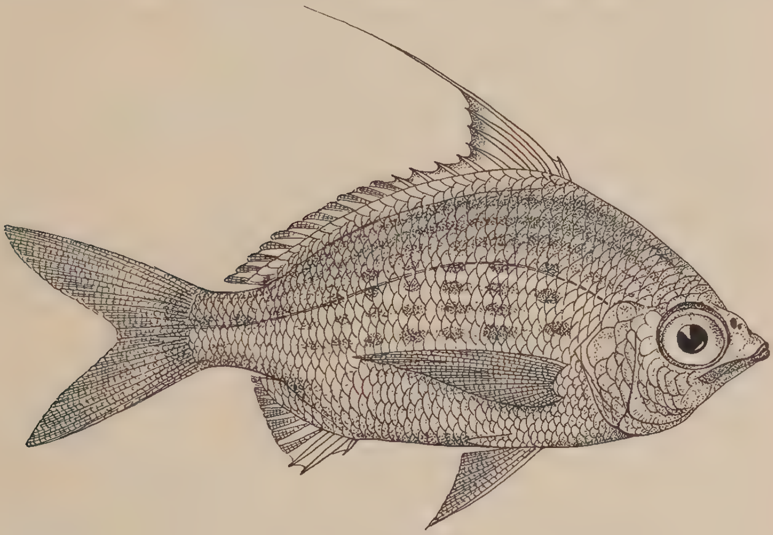

Fig. 73. *Gerres punctatus* (C. V.) $^4/_7$ nat. size.

2. **Gerres oyena** (Forsk.).

Labrus oyena Forskål, Descr. animal. 1775, p. 35.
Labrus oyena Bloch, Schneider, Syst. ichth. 1801, p. 245.
Labrus longirostris Lacépède, Hist. nat. Poiss. III. 1802, p. 467.
Labrus brittanus Lacépède, l. c. IV. 1803, p. 132, 134.
Smaris oyena Rüppell, Atl. Reise Nördl. Afrika, Fische, 1828, p. 11.
Gerres oyena Cuvier & Valenciennes, Hist. nat. Poiss. VI. 1830, p. 472 (p. p fide Sauvage).
? *Gerres oyena* Jenyns, Zool. „Beagle", Fishes, 1842, p. 59.
Gerres oyena Bleeker, Nat. & Geneesk. Arch. Ned. Ind. (3) II. 1845, p. 521 (name only).

Gerres oblongus Bleeker, ibidem (nec C. V., name only).
Gerres oyena Bleeker, Maenoïden, p. 12, Verh. Batav. Gen. XXIII. 1850.
Gerres oyena Günther, Cat. Brit. Mus. I. 1859, p. 352. — IV. 1862, p. 261.
Diapterus oyena Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 232.
Gerres oyena Playfair & Günther, Fish. Zanzibar 1866, p. 111.
Gerres oyena Klunzinger, Abh. zool. bot. Ges. Wien. XX. 1870, p. 772.
Gerres argyreus Klunzinger, l. c. p. 773.
Diapterus oyena Bleeker, Versl. Akad. Amsterdam (2) VII. (1872) 1873, p. 252. — Atl. ichth. VIII. 1876—77, p. 129.
Gerres oyena Day, Fish. India 4°, 1878—88, p. 99.
Gerres oyena Macleay, Descr. Cat. Austral. Fish. I. 1881, p. 78.
Gerres oeyena Klunzinger, Fische Roth. Meer., 1884, p. 49.
Gerres oyena Sauvage, Poiss. Madagascar, 1891, p. 243.
Gerres oyena Picaglia, Atti Soc. Modena (3) XIII. 1894, p. 27.
Xystaema oyena Seale & Bean, Proc. U. S. Nat. Mus. XXXIII. 1908, p. 244.
Xystaema oyena Seale, Philippine Journ. Sc. V. 1910, p. 278.
Xystaema oyena Kendall & Goldsborough, Mem. Mus. Comp. Zool. Harvard Coll. XXVI. 1911, p. 292.
Gerres oyena M. Weber, Siboga-Exp. Fische, 1913, p. 273.
Gerres oyena Chaudhuri, Mem. Ind. Mus. V. 1923, p. 726.
Xystaema oyena Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 628.
Gerres oyena Fowler, Fish. Oceania, Mem. Bern. P. Bishop Mus. X. 1928, p. 225.

D. IX. 10; A. III. 7; L. l. 35—38; L. tr. $\begin{array}{c}\underline{3^1/_2-4}\\ \underline{1}\\ 11\end{array}$.

Oblong, rostro-dorsal profile rounded and continued in the rounded dorsal profile; height 2.50 to about 3 in length; head 3 to 3.30; pointed. Eye 3.1 to 3.50 in head, equal to or somewhat less than interorbital space, which is scaleless in its middle; snout about equal to eye or somewhat shorter. Maxillary reaching slightly behind frontborder of eye; mandibular profile nearly not concave. Scales thin, deciduous. Praeoperculum entire, its angle rounded. Lower pharyngeal bones united by a mobile suture, covered by conical or tubulate small teeth, getting somewhat larger towards median line. Origin of dorsal at a distance from end of snout longer than height of body but conspicuously less than length of spinous and soft dorsal together. Second, third and fourth dorsal spine slender, longer than the following spines, the second and third subequal about twice in height of body. Second and third anal subequal or the third somewhat longer, about equal to diameter of eye. Pectorals reaching somewhat behind vertical through anus; ventrals shorter than head without snout. Least height of caudal peduncle somewhat less than its length. Colour silvery, darker above; spinous dorsal with a blackish margin. Length up to 180 mm.; according to Barnard up to 230 mm.

Nom. indig.: Kapas-kapas (Malay.); Terontang, Singrau, Gelomo, Dodok (Javan.).

Habitat: Singapore; Nias; Sumatra (Trussan); Java (Batavia, Samarang, Tjilatjap, Patjitan, Surabaya, Pasuruan); Madura; Cocos Isl.; Bali; Timor; Borneo (Sandakan); Celebes (Makassar, Kwandang Bay!); Salibabu!; Ternate; Buru; Ambon; Banda; Waigeu!. — Red Sea, Aden, Zanzibar, Mossambique, Mauritius, Madagascar, British India, Tonkin, Japan, Philippines, Torres Straits, Australia (Port Darwin), Fidji, Tongatabu, Caroline Isl., Guam. — In sea, brackish and fresh water.

Note: In the description of *Diapterus oyena* by Bleeker (Versl. Akad. Amsterdam (2) VII. (1872) 1873, p. 252) is a typographical error, repeated again in Atlas ichth. VIII. 1876–77, p. 129, when he says: „pectoralibus analem attingentibus capite non ad paulo longioribus analem non ad vix attingentibus". The words „analem attingentibus" must be canceled. In that case the length given for the pectoral will agree with the length found by Klunzinger and us.

3. Gerres poeti C. V.

Gerres poeti Cuvier & Valenciennes, Hist. nat. Poiss, VI. 1830, p. 468.
Gerres poetie Bleeker, Nat. & Geneesk. Arch. Ned. Ind. (3) II, 1845, p. 512 (name only). — Maenoïden, p. 11, Verh. Batav. Gen. XXIII. 1850.
Gerres poeti Günther, Cat. Brit. Mus. I. 1859, p. 341. — IV. 1862, p. 256.
Diapterus poetie Bleeker, Versl. Akad. Amsterdam 1864, XVI. p. 360.
Gerres poeti Kner, Novara-Exp. Fische 1865--67, p. 55 1)).
Gerres poeti Playfair, Proc. Zool. Soc. London 1867, p. 867.
Diapterus poeti Bleeker, Versl. Akad. Amsterdam (2) VII. (1872) 1873, p. 250. — Atlt ichth. VIII. 1876—77, p. 128.
Gerres poeti Day, Fish. India 4°, 1878—88, p. 100.
Gerres Poeti Macleay, Proc. Linn. Soc. N. S. Wales VIII, 1883, p. 261.
Gerres poeti Sauvage, Poiss. Madagascar 1891, p. 240.
Xystaema poeti Jordan & Seale, Bull. Bur. Fish. XXV. (1905) 1906, p. 272.
Gerres poieti (*sic*) Fowler, Fish. Oceania, Mem. Bern. P. Bishop Mus. X. 1928, p. 225.

D. IX. 10; A. III. 7; L. l. 35; L. tr. $\begin{array}{c}3-3^1/_2\\ \hline 1\\ \hline 10\end{array}$.

Oblong, compressed; height about 2.50 in length; head 3.4; the rostro-dorsal profile nearly straight with a naked concavity

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1) The figure of the lower pharyngeals given by Kner on his Pl. III, fig. 3 is not that of *G. poeti* but of *G. abbreviatus* Blkr. as shown by Bleeker.

above anterior third of eye. Eye about 3 in head, its diameter nearly equal to interorbital space and much longer than pointed snout. Maxillary reaching to below frontborder of eye, mandibulary profile slightly concave. Praeoperculum entire, its angle rounded. Lower pharyngeal bones united by mobile suture, peripherically covered with small, mostly conical and pointed teeth, the median ones granulate. Origin of dorsal at a distance from end of snout somewhat longer than height of body but about one fifth shorter than length of spinous and soft dorsal together. Dorsal and anal spines very strong and broad. The third dorsal spine the longest, about twice in height and more than 1.6 in head. The width of the second spine about one tenth of its length. The second and third anal spine subequal, much longer than postorbital part of head; the second the strongest, its width about one sixth of its length. Pectorals scarcely longer than head, not reaching anal. Ventrals about equal to head without snout. Least height of caudal peduncle one quarter shorter than its length. Colour silvery, back grayish, dorsal with a blackish margin. Length up to 150 mm. [Specimen of BLEEKER's collection in Amsterdam Museum seen by us].

Nom. indig.: Kapas-kapas; Hajam (Malay.); Bekututan (Javan.); Koppeh, Kumpar (Madura).

Habitat: Bintang; Riouw; Banka; Java (Batavia, Surabaya, Pasuruan); Madura; Ambon; Saparua; New Guinea. — Red Sea, East coast of Africa, Madagascar, British India, Seychelles, Andamans. — In sea.

4. **Gerres kapas** Blkr.

Gerres kapas Bleeker, Nat. Tijdschr. Ned. Indië II. 1851, p. 482.
Gerres kapas Günther, Cat. Brit. Mus. I. 1859. p. 352. — IV. 1862, p. 259.
Diapterus kapas Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 269.
Gerres capas Peters, Monatsber. Akad. Berlin 1868, p. 257.
Gerres singaporensis Steindachner, Sitzb. Akad. Wien LX. 1870, p. 568.
Diapterus kapas Bleeker, Versl. Akad. Amsterdam (2) VII. (1872) 1873, p. 246. — Atl. ichth. VIII. 1876—77, p. 127.
Gerres bispinosus Alleyne & Macleay, Proc. Linn. Soc. N. S. Wales I. 1875, p. 273 [1]).
Gerres bispinosus Jouan, Mém. Soc. Sc. nat. Cherbourg XXI. 1879, p. 6.
Ulaema bispinosum Jordan & Seale, Bull. Bur. Fish. XXV. (1905) 1906, p. 272.

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[1]) We agree with Fowler, that *Gerres bispinosus* Alleyne & Macleay „is quite likely a synonym. It is described with 2 anal spines, evidently a variant".

Xystaema kapas Evermann & Seale, Bull. Bur. Fish. XXVI. (1906) 1907, p. 70
Xystaema kapas Seale & Bean, Proc. U. S. Nat. Mus. XXXIII. 1907, p. 244.
Xystaema kapas Jordan & Dickerson, l. c. XXXIV. 1908, p. 610.
Xystaema kapas Jordan & Richardson, Bull. Bur. Fish. XXVII. (1907) 1908, p. 260.
Xystaema kapas Seale, Philippine Journ. Sc. V. 1910, p. 278.
Gerres kapas M. Weber, Siboga-Exp. Fische 1913, p. 271.
Gerres kapas Fowler & Bean, Proc. U. S. Nat. Mus. LXII. 1922, p. 41.
Gerres kapas Fowler, Fish. Oceania, Mem. Bern. P. Bish. Mus. X. 1928, p. 225.

D. IX. 10; A. III. 7; L. l. 40; L. tr. $\frac{4}{\frac{1}{10}}$.

Oblong, dorsal profile elevated and compressed at origin of dorsal, the rostro-dorsal profile ascending in a nearly straight line, somewhat concave before elevation at dorsal; height 2.37 in length; head 3 to 3.2, pointed; eye about 2.50 in head, longer than interorbital space, which is naked above anterior third of eye with a small median concavity; snout much shorter than eye. Maxillary reaching to below anterior third of eye, mandibular profile nearly not concave. Praeoperculum entire with rounded angle. Scales more or less crenulated. Origin of dorsal at a distance from end of snout somewhat longer than height of body and somewhat less than length of spinous and soft dorsal together. Second, third and fourth dorsal spine subequal and longer than the following spines, the length of the second nearly equal to head without snout. Second and third anal spine strong, subequal, or the second slightly longer and stronger, somewhat shorter than eye and snout. Pectorals longer than head, reaching vertical through origin of anal. Least height of caudal peduncle less than its length. Colour silvery with a bluish or greenish back, fins hyaline, the spinous dorsal with a black edge. Length 120 mm.

Nom. indig.: Kapas-kapas (Malay.).

Habitat: Singapore; Batu Isl.; Bintang (Riouw Isl.); Banka; Nias; Sumatra (Benkulen, Trussan, Priaman); Java (Batavia); Kangeang Isl.!; Borneo (Sandakan); Celebes (Makassar!, Bonthain, Tello, river Maros!); Timor (Kupang); Ambon; New Guinea. — Bangkok (v. Martens), Philippines, Fidji Isl. — In sea and mouth of rivers.

5. **Gerres punctatus** C. V. (Fig. 73, p. 345).

Gerres punctatus Cuvier & Valenciennes, Hist. nat. Poiss. VI. 1830, p. 480.
Gerres filamentosus Cuvier & Valenciennes, l. c. p. 482.

Gerres filamentosus Richardson, Ann. Mag. Nat. Hist. X. 1842, p. 25.
Gerres punctatus Bleeker, Nat. & Geneesk. Arch. Ned. Indië (3) II. 1845, p. 521 (name only).
Gerres filamentosus Bleeker, ibidem.
Catochaenum filamentosum Cantor, Journ. Asiat. Soc. Bengal XVIII. 1850, p. 1037.
Gerres filamentosus Bleeker, Maenoiden, p. 10, Verh. Batav. Gen. XXIII. 1850.
Gerres filamentosus Günther, Cat. Brit. Mus. I. 1859, p. 345. — IV. 1862, p. 261.
Gerres punctatus Günther, l. c. p. 346. — IV. 1862, p. 260.
Diapterus filamentosus Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 231.
Gerres filamentosus Kner, Novara-Exp. Fische, 1865—67, p. 56.
Gerres punctatus Kner, l. c. p. 57.
Gerres filamentosus Klunzinger, Abh. zool. bot. Ges. Wien XX. 1870, p. 773.
Diapterus filamentosus Bleeker, Atl. ichth. VIII. 1876—77, p. 124.
Diapterus punctatus Bleeker, l. c. p. 125.
Gerres filamentosus Day, Fish. India 4°, 1878—88, p. 98.
Gerres punctatus Macleay, Descr. Cat. Austral. Fish. I. 1881, p. 76.
Gerres fiamentosus (misprint for *filamentosus*) Macleay, l. c. p. 79.
Gerres filamentosus Klunzinger, Fische Roth. Meer. 1884, p. 48.
Gerres punctatus Sauvage, Poissons Madagascar, 1891, p. 246 [1]).
Xystaema filamentosum Jordan & Evermann, Proc. U. S. Nat. Mus. XXV. 1902, p. 352.
Gerres (*Pertica*) *filamentosus* Fowler, Journ. Acad. Nat. Sc. Philadelphia (2) XII. 1904, p. 530.
Xystaema punctatum Jordan & Seale, Proc. U. S. Nat. Mus. XXVIII. 1905, p. 782.
Xystaema punctatum Jordan & Seale, Bull. Bur. Fish. XXV. (1905) 1906, p. 272. — l. c. XXVI. (1906) 1907, p. 24.
Xystaema punctatum Evermann & Seale, l. c. XXVI. (1906) 1907, p. 69.
Zystaema punctatum Seale, Philipp. Journ. Sc. V. 1910, p. 277 (misprint for *Xystaema*).
Gerres filamentosus M. Weber, Siboga-Exp. Fische, 1913, p. 271.
Gerres filamentosus Fowler & Bean, Proc. U. S. Nat. Mus. LXII. 1922, p. 42.
Gerres punctatus Chaudhuri, Mem. Ind. Mus. V. 1923, p. 729.
Gerres filamentosus Fowler, Proc. Acad. Nat. Sc. Philadelphia LXXVII. 1925, p. 244.
Xystaema punctatum Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 627.
Gerres filamentosus Fowler, Fish. Oceania, Mem. Bern. P. Bishop Mus. X. 1928, p. 226.

D. IX. 10—11; A. III. 7—8; L. l. 45; L. tr. $\begin{array}{c}5\text{—}6\\\hline 1\\\hline 12\text{—}13\end{array}$.

Oblong, elevated, height 2—2.50 in length; head pointed, 3—3.30 in length, its rostro-occipital profile more or less concave before eyes, the median front without scales. Eye more or less than 3 in head, about equal to interorbital space, somewhat longer than pointed snout. Mandibular profile strongly concave. Maxillary surpassing front edge of eye. Praeoperculum entire, its angle rounded. Operculum with two blunt points. Inferior pharyngeal bones united by mobile suture forming a triangular plate with small, pointed teeth; the middle ones more granulated. Dorsal originates at a distance from end of snout, about equal to height of body and to length of spinous and soft portion of dorsal together. Second, third and fourth dorsal spines longer than the following, the second stronger and produced into a filament, about as long as body or somewhat shorter; second and third anal spine subequal, about as long as eye. Pectorals longer or much longer than head, reaching anal. Colour bluish-gray above, silvery below, in adult usually with several irregular series of oblong, horizontal bluish spots in upper half of body; end of snout blackish. Length up to 250 mm.

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[1]) After comparing the types of *Gerres punctatus* and *filamentosus* of Cuvier & Valenciennes, Sauvage comes to the conclusion, that both are identical and differ only by characters depending from the sex of the individuals.

Nom. indig.: Kapas-kapas (Malay.).

Habitat: Singapore; Penang; Banka; Sumatra (Padang, Benkulen, Trussan, Priaman); Java (Batavia, Anjer, Djungkulon, Cheribon, Samarang, Surabaya, Pasuruan, Prigi, Japara); Bawean; Madura; Bali; Sumbawa; Timor; Borneo (Sandakan); Celebes (Makassar!, Bulucomba, Badjoa, Tanette!); Sangir Isl.; Halmahera; Ternate; Batjan; Obi major; Ambon; Ceram!; Waigeu!; New Guinea. — Red Sea, Sokotra, Delagoa Bay, Natal, Mauritius, Madagascar, British India, Ceylon, Andamans, Siam (Tale Sap), Tonkin, China, Japan, Formosa, Philippines, Australia (Queensland), New Britain, New Hannover, Vanicolo. — In sea and mouth of rivers.

6. **Gerres macracanthus** Blkr.

Gerres macracanthus Bleeker, Nat. Tijdschr. Ned. Ind. VI. 1854, p. 195.

Gerres macracanthus Günther, Cat. Brit. Mus. I. 1859, p. 346. — l. c. IV. 1862, p. 261.

Diapterus macracanthus Bleeker, Versl. Akad. Amsterdam (2) VII. (1872) 1873, p. 239. — Atl. ichth. VIII. 1876—77, p. 125.

Gerres macracanthus Günther, Challenger Exp. Zool. VI. 1880, p. 56.

Gerres macracanthus Macleay, Proc. Linn. Soc. N. S. Wales VII. 1882, p. 240.

Gerres macracanthus M. Weber, Jenaische Denkschr. VIII. 1895, p. 103.

Xystaema macracanthum Jordan & Seale, Bull. Bur. Fish. XXV. (1905) 1906, p. 272 (name only).

Gerres macracanthus Bean & Weed, Proc. U. S. Nat. Mus. XLII. 1912, p. 606

Gerres macracanthus L. F. de Beaufort, Bijdr. Dierk. Leiden 1913, p. 121.

D. IX. 10; A. III. 9; L. l. 42—43; L. tr. $\begin{array}{c} 4-4^1/_2 \\ \hline 1 \\ \hline 10 \end{array}$.

Oblong, compressed, height 2.25 to 2.80 in length; head 3 to 3.5, pointed; rostro-dorsal line straight with a slight concavity above anterior part of eye, which is naked. Eye about 2.75 in head, slightly shorter than interorbital space and than extent of snout. Mandibular profile nearly not concave, maxillary reaching to below frontborder of eye. Praeoperculum entire, its angle nearly straight. Lower pharyngeal bones about as in *G. punctatus* C. V. Dorsal originates at a distance from end of snout shorter than height of body and about one quarter shorter than length of spinous and soft portion of dorsal together. Second, third, fourth and fifth spines compressed, longer than the sequent spines, the second produced into a thread-like filament somewhat longer or shorter than height of body. Second anal spine stronger but shorter than the third; about equal to eye. Pectorals longer than head; ventrals equal to head without snout. Colour silvery with greenish or brownish back with 5 or more diffuse brownish transverse, vertical bars, which easily get faded; fins hyaline, caudal and spinous dorsal with a dark margin; posterior dorsal spines and dorsal rays with a blackish dot near base. Length 166 mm.

Nom. indig.: Kapas-kapas (Malay. Batavia).

Habitat: Banka; Nias; Java (Batavia); Ambon (river)!; New Guinea. — Admirality Islands.

Note: Fowler (Fishes Oceania, Mem. B. P. Bishop Mus. X. 1928, p. 226) says: „*Gerres macracanthus* Bleeker was evidently based on immature examples [of *G. filamentosus* Cuv.], more slender and with dark vertical bands." Bleeker has described specimens of *G. macracanthus* of 166 mm., Günther of 125 mm. length; they can not be called „immature" as Fowler himself gives as length of *G. filamentosus* 204 mm.

7. **Gerres oblongus** C. V.

Gerres oblongus Cuvier & Valenciennes, Hist. Nat. Poiss. VI. 1830, p. 479.

Gerres oblongus Bleeker, Nalez. ichth. Fauna Bengalen, p. 40, Verh. Batav. Gen. XXV. 1853 (name only).

Gerres oblongus Günther, Cat. Brit. Mus. I. 1859, p. 354. — IV. 1862, p. 264.

Gerres gigas Günther, l. c. IV. 1862, p. 262. — Fische Südsee, I. 1873—1875, p. 30.

Gerres macrosoma Kner, Sitzber. Akad. Wien. LVIII. 1868, p. 301.

Gerres gigas Castelnau, Proc. Zool. Soc. Victoria 1873, p. 117.

Gerres oblongus Day, Fish. India, 4°, 1878—88, p. 98.

Gerres gigas Macleay, Proc. Linn. Soc. N. S. Wales, VII. 1882, p. 239.
Gerres oblongus M. Weber, Jenaische Denkschr. VIII. 1895, p. 103.
Gerres gigas Boulenger, Ann. Mag. Nat. Hist. (6) XX. 1897, p. 372.
Garres argyeus (misprint) Seale, Occas. Pap. B. P. Bishop Mus. I. 1901, p. 80 (nec C. V. fide Fowler, 1928).
Gerres (Xystaema) gigas Steindachner, Sitzb. Akad. Wien. CXV. 1906, p. 1380.
Xystaema gigas Jordan & Seale, Bull. Bur. Fish. XXV. (1905) 1906, p. 272.
Gerres oblongus M. Weber, Siboga-Exp. Fische, 1913, p. 272.
Gerres oblongus Fowler, Proc. Acad. Nat. Sc. Philadelphia LXXVII. 1925, p. 244.
Xystaema oblongus Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 629.
Gerres gigas Fowler, Fish. Oceania, Mem. Bern. P. Bishop Mus. X. 1928, p. 226.

D. IX. 10; A. III. 7; L. l. 46—48; L. tr. $\begin{array}{c}5^{1}/_{2}-6\\ \hline 1\\ \hline 10\end{array}$.

Oblong, height 3 to 3.4 in length, about equal to length of head, which is pointed, with the rostro-dorsal profile ascending in a nearly straight line, with a slight concavity above anterior part of eye. Eye 3, in young less than 3 in head, about equal to snout and naked interorbital space. Maxillary reaching to below frontborder of eye; profile of mandibula nearly not concave. Praeoperculum entire, its angle right, rounded. Seven pointed gillrakers on lower branch of first branchial arch. Lower pharyngeal bones coossified, forming a triangular plate, posteriorly deeply emarginate and peripherically covered by rather long pointed teeth, in the centre granular. Dorsal originates at a distance from end of snout, much shorter than length of spinous and soft portion of dorsal together and more than one fifth longer than height of body. Second dorsal spine rather strong and elongate, in large specimens once and $^1/_4$, in small once and $^1/_3$ contained in length of head. Second anal spine the strongest, nearly thrice in head. Pectorals somewhat longer than head in young, increasing in size with age, reaching vertical through origin of anal. Ventrals more than half length of head. Caudal with the upper lobe somewhat longer, about equal to head. Colour silvery, the dorsal with a narrow black margin, in young with indistinct dark transverse, vertical bands. Length up to 300 mm.

Habitat: Ambon!; Ceram!; New Guinea. — British India, Ceylon, Andamans, Delagoa Bay, Samoa, Fidji, Tonga, New Caledonia. In sea.

Note: One of us (Siboga-Exp. Fische 1913, p. 272) has tried to prove the correctness of the supposition of Day, that *Gerres gigas* Günther is identical with *G. oblongus* C. V.

8. Gerres macrosoma Blkr.

Gerres macrosoma Bleeker, Nat. Tijdschr. Ned. Ind. VI. 1854, p. 56.
Gerres macrosoma Günther, Cat. Brit. Mus. I. 1859, p. 353. — IV, 1862, p. 263.
Diapterus macrosoma Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 231.
Gerres macrosoma Peters, Monatsber. Akad. Berlin 1868, p. 257.
Diapterus macrosoma Bleeker, Versl. Akad. Amsterdam (2) VII. (1872) 1873, p. 244. — Atl. ichth. VIII. 1876—77, p. 126.
Gerres macrosoma Günther, Fische Südsee, Journ. Mus. Godeffr. 1873–75, p. 30.
Gerres (*Xystaema*) *macrosoma* Steindachner, Sitzb. Akad. Wien CXV. 1906, p. 1381.
Xystaema macrosoma Jordan & Seale, Bull. Bur. Fish. XXV. (1905) 1906, p. 272.
Gerres macrosoma de Beaufort, Bijdr. Dierk. Leiden 1913, p. 121.
Gerres macrosoma Fowler, Fish. Oceania, Mem. Bern. P. Bishop Mus. X. 1928, p. 224.

D. IX. 10; A. III. 7; L. l. ca. 42; L. tr. $\frac{4^1/_2—5}{\frac{1}{9—9^1/_2}}$.

Oblong, rostro-dorsal profile slightly convex with a very small median concavity above anterior third of eye, nearly not naked, the bordering scales reaching nostrils; height 2.50–3; head 3—3.50 in length. Eye 3 or somewhat more in head, equal to or slightly shorter than interorbital space and about equal to snout. Maxillary reaching to below anterior third of eye; mandibulary profile straight. Origin of dorsal at a distance from end of snout much longer than height of body but much shorter than length of spinous and soft dorsal together. Second dorsal spine the longest, more or less than 1.75 in height of body; second and third anal spines subequal, more than twice shorter than second dorsal spine and about equal to eye. Pectorals half diameter of eye longer than head and about equal to height of body, not reaching vertical through origin of anal; ventrals half length of pectorals. Upper lobe of caudal about equal to length of head. Least height of caudal peduncle shorter than its length. Lower pharyngeal bones united by a mobile suture, covered with small pointed teeth, more obtuse towards median suture. Colour silvery, back darker, spinous dorsal with a blackish margin. Length up to 246 mm. [Specimen of BLEEKER's collection in the Zoological Museum of Amsterdam seen by us].

Nom. indig: Kapas-kapas (Malay.).

Habitat: Singapore; Nias; Java (Batavia); Bali; Celebes (Makassar!); Timor; Ternate; Ambon; Saparua; Halmaheira; Obi major; Waigeu! — New Pommern, Samoa, Admirality Islands.

9. Gerres acinaces Blkr.

Gerres acinaces Bleeker, Nat. Tijdschr. Ned. Indië VI. 1854, p. 194.
Gerres acinaces Günther, Cat. Brit. Mus. I. 1859, p. 351. — IV. 1862, p. 262.
Gerres acinaces Playfair & Günther, Fish. Zanzibar, 1866, p. 110.
Gerres acinaces Day, Proc. Zool. Soc. London, 1870, p. 698.
Diapterus acinaces Bleeker, Versl. Akad. Amsterdam (2) VII. (1872) 1873 p. 242. — Atl. ichth. VIII. 1876—77; p. 126.
Gerres acinaces Macleay, Proc. Linn. Soc. N. S. Wales VII. 1882, p. 240.
Gerres Rüppellii Klunzinger, Fische Roth. Meer. 1884, p. 48.
Gerres acinaces Sauvage, Poiss. Madagascar, 1891, p. 245.
Gerres acinaces Steindachner, Denkschr. Akad. Wien LXXI. 1902, p. 137.
Xystaema acinaces Kendall & Goldsborough, Mem. Mus. Comp. Zool. Harvard Coll. XXVI. 1911, p. 291.
Xystaema acinaces Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 629.
Gerres acinaces Fowler, Fish. Oceania, Mem. Bern. P. Bishop Mus. X. 1928, p. 224.

D. IX. 10; A. III. 7; L. lat. 43; L. tr. $\begin{array}{c}5\\ \hline 1\\ \hline 11\end{array}$.

Oblong, height $2^2/_3$ to $2^3/_4$ in length, head $3^2/_5$—$3^1/_5$, pointed, rostro-nuchal profile concave and naked before eyes, thence continued in convex dorsal profile. Eye 3.50 in head, equal to or somewhat more than interorbital space and equal to or slightly shorter than pointed snout. Mandibular profile straight. Maxillary reaching anterior border of eye. Praeoperculum entire, its angle rounded. Lower pharyngeal bones about as in *G. punctatus*. Dorsal originates at a distance from end of snout, much longer than height of body, but conspicuously shorter than length of spinous and soft portion of dorsal together. Second dorsal spine longer than half height of body and half length of head; the second, third and fourth spines the longest. Second anal spine slightly the longest, about equal to postocular part of head. Pectorals longer than head, reaching about anal. Colour silvery, bluish above, fins hyaline. Length 260 mm.

Nom. indig.: Kapas-kapas (Malay. Batavia).

Habitat: Java (Batavia); Cocos Isl.; Celebes (Badjoa); New Guinea. — Red Sea, Aden, Zanzibar, Delagoa Bay, Zululand coast, Natal, Madagascar, Sokotra, Muscat, Andamans, Ellice-, Tonga Islands.

10. Gerres argyreus (Bloch, Schn.).

Cichla argyrea Bloch, Schneider, Syst. Ichth. 1801, p. 344.
? *Gerres vaigiensis* Quoy & Gaimard, Voy. Uranie & Physic. 1824, p. 292.
Gerres argyreus Cuvier & Valenciennes, Hist. nat. Poiss. VI. 1830, p. 478.
Sciaena argyrea Forster, Descr. Anim. maris austral. ed. Lichtenstein 1844, p. 291.
Gerres argyreus Günther, Cat. Brit. Mus. I. 1859, p. 353. — IV. 1862, p. 263.

Gerres argyreius (*misprint*) Jouan, Mém. Soc. Sc. Nat. Cherbourg (2) III. 1867, p. 263.
Gerres argyreus Playfair, Proc. Zool. Soc. London 1867, p. 867.
Diapterus argyreus Bleeker, Versl. Akad. Amsterdam (2) II. (1867) 1868, p. 297. — Atl. ichth. VIII. 1876—77, p. 127.
Gerres argyreus Macleay, Proc. Linn. Soc. N. S. Wales IV. (1879) 1880, p. 62.
Gerres argyreus Macleay, Descr. Cat. Austral. Fish. I. 1881, p. 78.
Gerres argyreus Klunzinger, Fische Roth. Meer. 1884, p. 48.
Gerres argyreus Sauvage, Poiss. Madagascar, 1891, p. 242.
Gerres argyreus Picaglia, Atti Soc. Modena (3) XIII. 1894, p. 27.
Xystaema argyreum Jordan & Seale, Bull. Bur. Fish. XXV. (1905) 1906, p. 272.
Xystaema argyreum Kendall & Goldsborough, Mem. Mus. Comp. Zool. Harvard Coll. XXVI. 1911, p. 291.
Gerres argyreus M. Weber, Siboga-Exp. Fische 1913, p. 272.
Gerres argyreus McCulloch, Check-list fish. N. S. Wales II. 1919, p. 58.
Gerres argyreus Fowler, Fish. Oceania, Mem. Bern. P. Bishop Mus. X. 1928, p. 228.
Gerres argyreus Whitley, Rec. Austral. Mus. XVII. 1929, p. 116.

D. IX. 10; A. III. 7; L. l. ca. 45; L. tr. $\begin{array}{c}4^1/_2-5\\ \hline 1\\ \hline 10-11\end{array}$.

Oblong, compressed, height 2.7—3 in length; rostro-dorsal profile ascending in a nearly straight line, with a median, rather small but conspicuous naked concavity, bordered by a scaly area nearly reaching nostrils. Head pointed, 3.3—3.7 in length. Eye about thrice in head, somewhat longer than snout and about equal to interorbital space. Maxillary reaching to below anterior third of eye, mandibulary profile nearly not concave. Origin of dorsal at a distance from end of snout not much longer than height of body but conspicuously shorter than length of spinous and soft dorsal together. Spines slender; spinous dorsal not much emarginate, the second and third spines subequal, $1^3/_4$ to nearly 2 in height of body. Second anal spine somewhat stronger than third, both subequal, twice to two and a half in length of second dorsal spine. Pectorals longer than head, not reaching vertical through origin of anal. Ventrals shorter than head without snout. Caudal about as long as head. Least height of caudal peduncle about one quarter shorter than its length. Colour silvery, top of anterior part of spinous dorsal with a narrow black margin. Length up to 185 mm.

Habitat: Singapore (? Karoli); Java (Karoli); Salibabu!; Kei Isl.!; Waigeu. — Red Sea, Mozambique, Zanzibar!, Madagascar, Bourbon, Seychelles, Hongkong (Jouan), Australia (N. S. Wales), New Hebrides, Solomon Isl., Samoa, Tahiti, Tanna, Ellice Isl. — In sea.

Species doubtful as to their occurrence in the Archipelago.

11. Gerres limbatus C. V.

Gerres limbatus Cuvier & Valenciennes, Hist. nat. Poiss. VI. 1830, p. 476.
Catochaenum limbatum Cantor, Journ. Asiat. Soc. Bengal 1850, p. 1038.
Gerres limbatus Bleeker, Versl. Akad. Amsterdam XII. 1861, p. 71.
Gerres limbatus Günther, Cat. Brit. Mus. IV. 1862, p. 259.
Diapterus limbatus Bleeker, Versl. Akad. Amsterdam (2) VII. (1872) 1873, — p. 249. Atl. ichth. VIII. 1876—77, p. 128.
Gerres limbatus Day, Fish. India 4°, 1878—88, p. 100.
Gerres limbatus Karoli, Termeszetrajzi füzetek V. 1882, p. 9.
Gerres limbatus Duncker, Mitt. Naturh. Mus. Hamburg, XXI. 1904, p. 150.

B. VI, D. $\frac{9}{10}$, P. 15, V $^1/_5$, A. $\frac{3}{7}$, C. 17, L. l. 35, L. tr. $^4/_{10}$.

Length of head $^1/_4$, of caudal $^3/_{13}$, height of body $^4/_{13}$ of the total length. Eyes — diameter $^1/_3$ of length of head, $^2/_3$ of a diameter from end of snout, and 1 apart. The maxilla reaches to below the first third of the eye. Fins — dorsal spines not very strong, the second and third of about equal length, compressed and somewhat arched, the third being slightly the longer and equal to the length of the head behind the middle of the orbit, the last spine nearly equal to half the height of the rays and almost as long as the postorbital portion of the head: pectoral as long as the head and reaching to nearly above the anal spines: ventral extends three-fourths of the distance to the anal: second anal spine much the strongest, also stronger than those in the dorsal fin but slightly shorter than the third which nearly equals the second of the dorsal fin: caudal deeply forked. Scales — the sheath of the dorsal fin moderately developed: numerous fine scales over the caudal: three rows between the summit of the lateral-line and the base of the dorsal fin. Free portion of the tail as high at its commencement as it is long. Colours — silvery, with a dark margin to the dorsal and anal fins, and a spot on each spine and ray of the dorsal fin about its middle.

Habitat: Seas of India. The type specimen at Paris is $4^1/_2$ inches in length, and from it the above description has been taken. I obtained a specimen 5 inches in length at Madras. It much resembles *G. lucidus* but is destitute of the dark blotch on the dorsal fin. [Description after Day].

We add this fish to our list, as it is, according to Cantor, quite common at Penang and as it is recorded by Karoli also from Singapore, though this is the only record from that place, but otherwise not known from the Archipelago.

12. **Gerres setifer** Ham. Buch.

Chanda (?) *setifer* Hamilton Buchanan, Fish. Ganges, 1822, p. 105 & 370.
Gerres lucidus Cuvier & Valenciennes, Hist. nat. Poiss. VI. 1830, p. 477.
Gerres lucidus Bleeker, Nalez. ichth. fauna Bengalen, p. 40, Verh. Batav. Gen. XXV. 1853 (name only).
Gerres altipinnis Günther, Cat. Brit. Mus. IV. 1862, p. 258.
Gerres lucidus Jouan, Mém. Soc. Sc. nat. Cherbourg XIII. 1867. p. 263.
Gerres setifer Day, Fish. India 4°, 1878—88, p. 97, 786.
Gerres lucidus Day, l. c. p. 99.
Gerres lucidus Jenkins, Rec. Indian Mus. V. 1910, p. 131, 135.
Xystaema lucidus Seale, Philippine Journ. Sc. V. 1910, p. 278.
Gerres lucidus Sewell, Journ. Asiat. Soc. Bengal (n. s.) IX. 1913, p. 344.
Xystaema lucidum Jordan & Starks, Ann. Carnegie Mus. XI. 1917, p. 455.
Gerres setifer Chaudhuri, Mem. Indian Mus. V. 1923, p. 727 (see synon. & references).
Gerres lucidus Hora, Mem. Asiat. Soc. Bengal VI. 1924, p. 487.

B. VI, D. $\frac{9}{10}$, P. 15, V. $^1/_5$, A. $\frac{3}{7}$, C. 17, L. l. 40. L. tr. $^5/_{10}$, Caec. pyl. 3.

„Length of head $^2/_9$, of caudal $^2/_9$, height of body $^1/_3$ of the total length. Eyes — diameter $^2/_5$ of length of head, $^2/_3$ of a diameter from end of snout, and 1 apart. The groove for the posterior process of the premaxillary is ovate, scaleless, and reaches to nearly opposite the first third of the orbit. The maxilla reaches to below the first third of the orbit. Preopercle entire, in a few specimens it is a little roughened along its horizontal edge, but not serrated. Teeth — fine. Fins — dorsal spines of moderate strength and not curved, the first very short, the third slightly longer than the second and equal to two-fifths of the height of the body, or the length of the head posterior to the middle of the orbit: pectoral longer than the head and reaching to above the anal spines: ventrals reach two-thirds of the way to the anal: second anal spine stronger[1]) but generally not quite so long as the third which is a little longer than the third of the dorsal: caudal forked. Free portion of the tail as high at its commencement as it is long. Scales — the sheath for the dorsal fin is rather more developed than

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1) The second anal spine is much stronger in this species than in specimens of *G. japonicus*, which however it very strongly resembles.

that for the anal: a few scales over the caudal: four rows between the lateral-line and the base of the fourth dorsal spine. Colours — silvery, with an indistinct vertical dark band over the nape, a second from below the dorsal spines, and two more below the soft portion of the dorsal fin: snout black: fins canary-yellow, the upper half of the membrane between the second and fifth dorsal spines deep black [1]), the rest of the fin dark edged with a black margin: a row of dark spots along the dorsal spines and rays at half their height: caudal grey-edged, the inferior caudal lobe with a very narrow white lower edge and a white tip.

As this fish increases in length the height of the body becomes proportionately a little less, thus at 5 inches in length it is $^4/_{13}$ of the total: and the eye $^3/_4$ of a diameter from the end of the snout.

This species is closely allied to *G. setifer*, but the latter appears to be confined to the tidal Hooghly, whereas this is a marine form having one dorsal spine less, &c., as already pointed out (see p. 98)." [Description of *G. lucidus* after Day].

Note: This species is known from British India, Ceylon, Siam and Hongkong. There exists only one record of its occurrence in the Archipelago. Seale (l. s. c.) names it from Borneo (Sandakan). But as he gives only scanty information about the single specimen of only 92 mm. length, of which he could dispose, doubt is permitted about the correctness of his statement. He adds: „A food-fish of but little importance in Borneo". About other fishes in his record he gives similar informations. We do not understand how it is possible to gain these informations while staying and collecting only for four days in an island as big as Great Britain and Ireland.

4. **Pentaprion** Bleeker.

(Bleeker, Bijdr. Maenoïden, p. 13, Verh. Batav. Gen. XXIII, 1850).
Clara Gill, Proc. Acad. nat. sc. Philadelphia 1862, p. 127.

Compressed, oblong, covered with deciduous, cycloid scales of moderate size, present also on occipital, frontal and lateral parts of head. Lateral line complete and continuous. No bony ridges on top of head. Mouth small, protractile, when protruded descending downwards. Praeoperculum with the lower margin slightly denticulate, its angle rounded. Six branchiostegals; four gills; pseudobranchiae present; gillmembranes free, not united with isthmus; lower pharyngeal bones not united.

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[1]) This deep black colour of the dorsal interspinous membrane, is liable to be diminished in specimens which have been kept long in spirit, especially if their condition at first had not been very good or the liquor tainted.

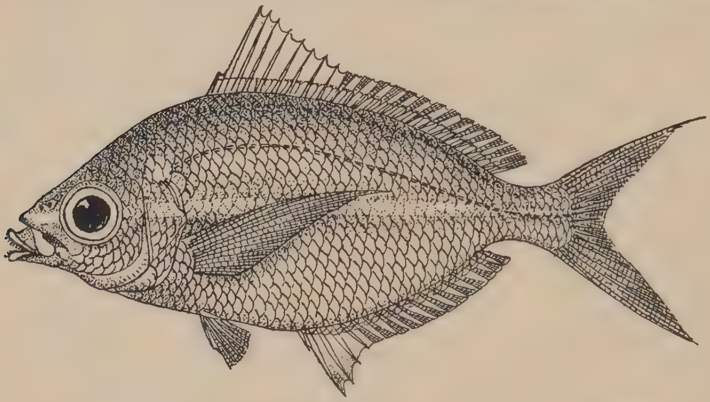

Fig. 74. *Pentaprion longimanus* (Cantor) nat. size. (After Bleeker).

Pluriseriate small acute teeth in jaws, none on palate. A single dorsal X. 14—15; anal V. 13—14; both fins with a high scaly basal sheath, separated from the other fins; pectorals long, pointed, ventrals inserted below base of pectorals, I 5, with an axillary scale-like process; caudal deeply incised, with 15 branched rays.

Distribution: that of the single species known.

1. **Pentaprion longimanus** (Cantor) [Fig. 74 p. 360].

Equula longimana Cantor, Journ. Asiat. Soc. Bengal XVIII. 1850, p. 1134.

Pentaprion gerreoides Bleeker, Maenoïden, p. 13, Verh. Batav. Gen. XXIII. 1850. — Nat. Tijdschr. Ned. Indië I. 1850, p. 104.

Pentaprion gerreoides Günther, Cat. Brit. Mus. I. 1859, p. 396.

Equula longimanus Günther, l. c. II. 1860, p. 505.

Pentaprion gerreoides Bleeker, Versl. Akad. Amsterdam (2) VII. (1872) 1873, p. 254.

Pentaprion longimanus Bleeker, Atl. ichth. VIII. 1876—77, p. 130.

Pentaprion longimanus Day, Fish. India 4°, 1878—88, p. 101.

Equula longimana Duncker, Mitth. Naturh. Mus. Hamburg XXI. 1904, p. 158.

Pentaprion longimanus Fowler, Journ. Acad. Nat. Sc. Philadelphia (2) XII. 1904, p. 517.

Pentaprion longimanus Jordan & Seale, Bull. Bur. Fish. XXVI. (1906) 1907, p. 24.

Pentaprion longimanus Fowler & Bean. Proc. U. S. Nat. Mus. Washington LXII. 1922, p. 42.

D. IX—X, 14—15; A. V. 13; L. l. ca. 40.

Height 2.25—2.75, head 3.25—3.50 in length. Eye about 2.75, nearly equal to interorbital space, longer than pointed snout; rostro-dorsal profile slightly convex, with a flat concavity before eye. Maxillary reaches to below frontborder of eye; mandibular profile straight. Spines slender, the third dorsal about twice height of body; second anal about one third that height. Pectorals longer than head, reaching anal; ventrals not longer than diameter of eye. For other characters see those of the genus. Colour silvery with a silvery stripe from eye to caudal. Length up to 127 mm.

Nom. indig.: Hajam (Malay.).

Habitat: Malay Peninsula; Singapore; Penang; Sumatra (Priaman); Java (Batavia, Anjer); Celebes (Makassar, Badjoa). — British India (Madras), Formosa, Philippines. In sea and brackish water.

19. Family MULLIDAE.

Elongate, somewhat compressed, covered with large scales, which are usually slightly ctenoid and are also present on head, wanting only on the anterior part of the parabolic snout. Lateral line complete, the sensory tubes often branched. Mouth small, protractile, subterminal, low, the maxillary more or less enclosed; no supplemental maxillary bone. Teeth in jaws small, pluriseriate or uniseriate, conical, acute and of moderate size [1]; on vomer and palatines present or absent. Characterized by two long, unbranched barbels attached to the hyoid behind symphysis of lower jaw. Praeoperculum entire or slightly serrate, operculum with or without a single flat spine. Gill-membranes free from isthmus; three to four branchiostegals; four gills; pseudobranchiae present. Two short dorsal fins, remote from each other; the spinous dorsal with VI—VIII spines, depressible in a groove; the true first spine usually minute or obsolete; soft dorsal with 7 to 9 rays; anal of similar length with one or two spines. Pectorals generally short, pointed; ventrals with a spine, 5 soft rays and a scaly axillary process. Caudal deeply emarginate with 13 branched rays.

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[1] The upper jaw is toothless in the genus *Mullus* L., wanting in the indo-australian region.

Vertebrae 24 (10+14); occipital and parietal crests developed; a strong subocular shelf.

Distribution: Marine fishes of moderate size, some species entering fresh water, found in all tropical seas, extending northwards into the temperate seas. Much valued as food-fishes.

Key to the indo-australian genera of Mullidae

I. Teeth on vomer and palatines.
  1. Teeth in both jaws in villiform bands. Soft dorsal and anal anteriorly scaly. Maxillary reaching close below anterior half of eye . . . 1. *Upeneus* p. [illegible]

II. No teeth on palate; dorsal and anal without scales.
  1. Teeth in both jaws in narrow villiform bands. Maxillary not reaching eye in adult. Lateral line 35 to 40. No enlarged ventral scales . . . 2. *Mulloidichthys* p. [illegible]
  2. Teeth in both jaws in a single series, rather strong, acute. Maxillary far distant from eye. Lateral line 28 to 30. The three ventral series of scales, between ventrals and anal, more or less obtusely carinated . . . . 3. *Parupeneus* p. [illegible]

1. Upeneus C. V.

Cuvier & Valenciennes, [illegible]
Upeneus Bleeker, [illegible]
(Sect. char.)

Upeneus Bleeker, [illegible]

Elongate, more or less compressed, [illegible] dorsally [illegible] arched, covered with large, ctenoid

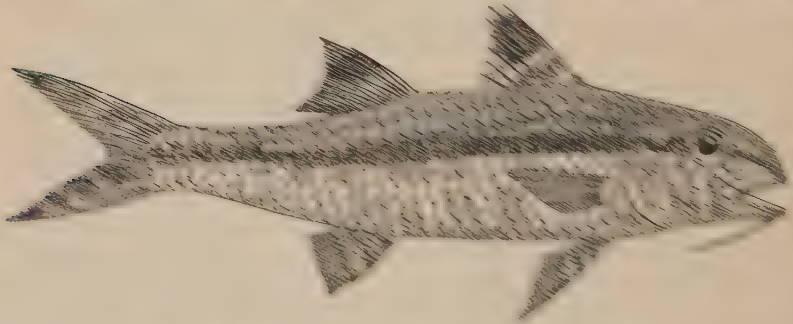

Fig. 75. *Upeneus tragula* Richards. $^2/_3$ nat. size.

scales. Lateral line with 30 to 38 scales, tubules more or less arborescent; a few similar scales continued on caudal. Head convex, with an obtuse snout, covered with scales on occiput, praeorbital naked or scaly; cheeks with three to five oblique series of scales. Eye situated near frontal profile, in middle of head or for its major part more anteriorly, maxillary reaching about below anterior third of eye. Teeth small, acute, in both jaws in villiform bands, on vomer in a Λ-formed band, on palatines in a slender band. Soft dorsal and anal anteriorly on its basal half covered with scales. For other characters see those of the family.

Distribution. Marine, littoral fishes of small or moderate size, living in the tropical and subtropical parts of the Indo- and western Pacific. Some of the species are important and excellent food-fish.

Note. For the use of the name *Upeneus* C. V. see the note under the following genus *Parupeneus*.

Key to the indo-australian species of Upeneus.

I. *Praeorbital without scales.*
  1. *Eye almost in middle of head. 3.50—3.75. Gillrakers 19—20 (+ 5). Major part of lateralia rigid. Four yellow longitudinal stripes on sides of body; caudal not banded* . . . 1. *U. sulphureus* p. 362.
  2. *Eye almost in middle of head. 4—4.2. Gillrakers 12 (+ 5). Lateralia rigid only at base. Four yellow or brown lines on sides of body; lobes of caudal with four or five oblique black bands.* . 2. *U. vittatus* p. 363.
  3. *Major part of eye situated in anterior part of head. 3.7—4. Gillrakers 14 (+ 6). Lateralia rigid only at base. A dark line from eye to caudal.* . 3. *U. moluccensis* p. 367.

II. *Praeorbital scaly; eye in middle of head or somewhat nearer to hindmargin of operculum, than to vertical end of snout.*
  1. *First and second dorsal of about equal height. Lateral line 30. Head and body spotted with brown; a dusky band from snout through eye to caudal; caudal lobes each with four or five dark bands* . . . . 4. *U. tragula* p. 368.
  2. *First dorsal much higher than second. Lateral line 32—35. A narrow brown band from eye to caudal. Not spotted.*
    a. *Upper caudal lobe with 4—5 broad oblique bands, posterior margin of lower lobe* . . . 5. *U. sundaicus* p. 371.
    b. *Caudal lobes with 6 or more oblique bands. A brown saddle over anterior half of caudal peduncle, a similar blotch one below second dorsal.* . . . . 6. *U. luzonius* p. 372.

1. Upeneus sulphureus C. V.

Upeneus sulphureus Cuvier & Valenciennes, Hist. Nat. Poiss. III. 1829, p. 450.

Upeneus bivittatus Cuvier & Valenciennes, op. cit. VII. 1831, p. 520.

Upeneus sulphureus Bleeker, Nat. & Geneesk. Arch. Ned. Indië (3) II. 1845. p. 527 (name only).

Upeneoides sulphureus Bleeker, Percoïden p. 63, Verh. Batav. Gen. XXII. 1849.

Upeneoides bivittatus Bleeker, l. c. p. 64 (nec synon.).

Hypeneus vittatus var.? Cantor, Journ. Asiat. Soc. Bengal XVIII. (1849) 1850, p. 1017 (nec synon.).

Upeneoides sulphureus Bleeker, Achtste Bijdr. Ambon, p. 45, Acta Soc. Sc. Indo-neerl. II. 1857.

Upeneoides sulphureus Günther, Cat. Brit. Mus. I. 1859, p. 398.

Upeneoides sulfureus Kner, Novara-Exp. Fische 1865—67, p. 67.

Upeneoides bivittatus Day, Proc. Zool. Soc. London 1867, p. 702.

Upeneoides fasciolatus Day, l. c. 1868, p. 151.

Mulloides pinnivittatus Steindachner, Sitzb. Akad. Wien LXII. 1870, p. 624 (fide Steindachner 1883).

Upeneus sulphureus Bleeker, Révis. Mulloïdes, p. 4, Verh. Akad. Amsterdam XV. (1873) 1875. — Atl. ichth. IX. 1878, Pl. 393, fig. 4.

Upeneoides sulphureus Day, Fish. India 4°, 1878—88, p. 120.

Upeneoides sulphureus Steindachner & Döderlein, Denkschr, Akad. Wien XLVIII. 1883. p. 23.

Upeneoides sulphureus Sauvage, Poissons Madagascar 1891, p. 217.

Upeneus sulphurus (sic) Evermann & Seale, Bull. Bur. Fish. XXVI. 1906, p. 88.

Upeneus sulphureus Snyder, Proc. U. S. Nat. Mus. XXXII. 1907, p. 99.

Upeneus sulphureus Jordan & Seale, Bull. Bur. Fish. XXVI (1906) 1907, p. 26.

Upeneoides sulphureus Seale, Philipp. Journ. Sci. V. 1910, p. 279.

Upeneus sulphureus Kendall & Goldsborough, Mem. Mus. Comp. Zool. Harvard Coll. XXVI. 1911, p. 293.

Upeneus sulphureus M. Weber, Siboga-Exp. Fische 1913, p. 293.

Upeneoides sulphureus Hase, Jen. Ztschr. Naturw. LI. 1914, p. 529.

Upeneoides belaque Fowler, Proc. Acad. Nat. Sci. Philadelphia LXX. 1918, p. 14.

Upeneoides belaque Fowler & Bean, Proc. U. S. Nat. Mus. LXII. 1922, p. 42.

Upeneus sulphureus Hora, Mem. Asiat. Soc. Bengal. VI. 1924, p. 487.

Upeneoides sulphureus Herre & Montalban, Philipp. Journ. Sci. XXXVI. 1928, p. 103.

Upeneoides sulphureus Fowler, Fish. Oceania, Mem. Bishop. Mus. X. 1928, p. 227.

D.^{1} VIII, D.^{2} I 8; A. I 6; L. l. 34—36 (+ 2); L. tr. $\begin{array}{c}2^1/_2\\ \hline 1\\ \hline 6^1/_2\end{array}$.

Oblong, its dorsal profile more convex than the ventral, height below origin of first dorsal 3.20 to 3.50 in length; head of equal length or slightly longer, its rostro-dorsal profile strongly and evenly convex till first dorsal. Eye situated in middle of head, near frontal profile, 3.50 to 3.75 in head, about equal to nearly flat interorbital space, but much shorter than convex, obtuse snout. Mouth nearly horizontal; the mandible somewhat enclosed. Maxilla almost truncate behind, extending to below anterior third of eye. Operculum with a spine. Gill-rakers 19 to 20 on lower branch of first branchial arch, the 5 lowest rudimentary. Barbels for their major part rigid, reaching nearly hindborder of operculum, in young not so far. Scales large, ctenoid, covering head; praeorbital almost naked; sensory tubes of lateral line strongly arborescent. First dorsal acute, much higher than second, the first spine minute, the second and third subequal, longest, 1.2 to 1.4 in length of head. Second dorsal and anal of equal height, emarginate. Distance between first and second dorsal about $^3/_4$ of length of base of first. Pectorals 1.14 in head, longer than ventrals; caudal somewhat shorter than head. Colour in alcohol yellowish, back darker with traces of three longitudinal stripes above lateral line and two lighter ones below it; spinous dorsal with three longitudinal bands and a blackish top; a dark blotch on top of soft dorsal with two faint bands; hindborder of caudal with a black or white edged margin; other fins more or less yellowish. Length up to 170 mm.[1]). [Specimen of BLEEKER's collection in Amsterdam Museum seen by us].

Nom. indig.: Bidji-nangka, Kunir, Kakunir (Malay.); Kuning (Madura); Kuniran (Javan.).

Habitat: Singapore!; Bintang; Banka; Simalur!; Sumatra (Tandjong, Benkulen, Trussan, Padang, Siboga); Java (Batavia!, Tandjong Priok!, Japara); Madura; Bali; Lombok!; Sumbawa!; Flores!; Timor; Borneo (Balikpapan!, Sandakan); Celebes (Makassar!, Badjoa, Menado); Ambon; Buru; Ceram!; Waigeu; New Guinea. — British India, Andamans, Malakka, Siam, Tonkin, Southern China, Southern Japan, Philippines, Ile de France, Madagascar, Mauritius, New Pommern, Fidji Isl., New Hebrides.

2. **Upeneus vittatus** (Forsk.).

Mullus vittatus Forskål, Descr. Animal. 1775, p. 31.
Mullus vittatus Bloch, Schneider, Syst. ichth. 1801, p. 79.
Mullus vittatus Lacépède, Hist. nat. Poiss. III. 1802, p. 382, 401.
Mullus bandi Shaw, Gener. Zoology, Pisces IV. 1803, p. 615.
Mullus vittatus Shaw, l. c. p. 616.

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[1] All the authors agree that this is a small species, one of the commonest in the Archipelago; Sauvage (l. s. c.) is the only author who gives the extraordinary length of 265 mm., his figure makes also a rather doubtful impression.

Upeneus vittatus Cuvier & Valenciennes, Hist. nat. Poiss. III. 1829, p. 448.
Upeneus vittatus Bleeker, Nat. & Geneesk. Arch. Ned. Ind. (3) II. 1845, p. 528.
Upeneoides vittatus Bleeker, Percoïden, p. 63, Verh. Batav. Gen. XXII. 1849.
Hypeneus vittatus Cantor, Journ. Asiat. Soc. Bengal XVIII. 1850, p. 1017.
Upeneoides vittatus Bleeker, Achtste Bijdr. Ambon, p. 42, Acta Soc. Sc. Indo-Neerl. II. 1857.
Upeneoides vittatus Günther, Cat. Brit. Mus. I. 1859, p. 397.
Upeneus vittatus Jouan, Mém. Soc. Sc. Nat. Cherbourg VIII. 1861, p. 295.
Mullus vittatus Playfair & Günther, Fish. Zanzibar, 1866, p. 40.
Upeneoides vittatus Klunzinger, Abh. zool. bot. Ges. Wien XX. 1870, p. 741.
Upeneoides vittatus Günther, Fische Südsee 1873—75, p. 55.
Upeneus vittatus Bleeker, Révis. Mulloïdes, p. 6, Verh. Akad. Amsterdam XV. (1873) 1875. — Atl. ichth. IX. 1878, Pl. 392, fig. 3.
Upeneoides vittatus Day, Fish. India 4°, 1878—88, p. 120.
Upeneoides vittatus Macleay, Descr. Cat. Austral. Fish. I. 1881, p. 102.
Upeneus vittatus Klunzinger, Fische Roth. Meer., 1884, p. 49.
Upeneoides vittatus Sauvage, Poiss. Madagascar, 1891, p. 219.
Upeneoides vittatus Fowler, Proc. Acad. Nat. Sci. Philadelphia, 1900, p. 520.
Upeneoides vittatus Jordan & Evermann, Proc. U. S. Nat. Mus. XXV. 1902, p. 335.
Upeneus vittatus Seale, Occ. Papers Bishop Mus. IV. 1906, p. 51.
Upeneus vittatus Jordan & Seale, Bull. Bur. Fish. XXV. (1905) 1906, p. 273.
Upeneoides vittatus Gilchrist & Thompson, Ann. S. African Mus. IV. 1908, p. 163.
Upeneoides vittatus Seale, Philipp. Journ. Sci. V. 1910, p. 278.
Upeneus vittatus M. Weber, Siboga-Exp. Fische, 1913, p. 292.
Upeneus vittatus de Beaufort, Bijdr. Dierk. Leiden 1913, p. 123.
Upeneoides philippinus Fowler, Proc. Acad. Nat. Sci. Philadelphia LXX. 1918, p. 37.
Upeneus vittatus Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 584.
Upeneoides vittatus Herre & Montalban, Philipp. Journ. Sci. XXXVI. 1928, p. 105.
Upeneoides vittatus Fowler, Fish. Oceania, Mem. Bishop Mus. X. 1928, p. 226.

D.^{1} VIII, D.^{2} I 8; A. I 7; L. l. 35—36; L. tr. $\begin{array}{c}2\frac{1}{2}\\ \hline 1\\ \hline 6\frac{1}{2}\end{array}$.

Oblong, somewhat compressed, dorsal profile much more convex than ventral profile; depth below first dorsal 3.6 to 3.9 in length; head 3.3 to 3.6; its rostro-dorsal profile arched, steepest in the rostral part. Eye situated quite near dorsal profile, almost in middle of length of head, 4 to 4.2 in head; about equal to nearly flat interorbital space; much shorter than obtuse snout, its diameter going about 1.3 to 1.5 in length of snout. Mouth almost horizontal, the mandible nearly not included; maxilla reaching to below anterior third of eye, rounded and very broad posteriorly. Barbels with their basal half rigid, almost reaching hindmargin of praeoperculum. Operculum with a weak spine. Scales large, ctenoid, reaching to nostrils, wanting on praeorbital. Teeth in villiform bands in jaws, on vomer in a triangular, on palatines in a slender band. Gillrakers about 12 and 5 rudimentary ones. Anterior part of first dorsal strongly elevated, the first spine minute, often inconspicuous; the third longest, about 1.3 in length of head, slightly longer than second and fourth; about one third higher than second dorsal, the distance of which from first dorsal nearly equals the length of the base of that fin. Second dorsal and anal about equally high, emarginate, their anterior lower half scaly. Pectorals 1.3—1.5 in length of head, ventrals conspicuously shorter. Caudal slightly shorter than head. Colour in alcohol reddish or greyish above, yellow below, with five more or less pronounced longitudinal yellow bands from eye to caudal, three above lateral line; fins yellow, the spinous dorsal with a large, the soft dorsal with a small black top; the caudal with three or five longitudinal black bands on its upper lobe and three on the lower lobe. Length up to 300 mm.

Nom. indig: Bidji-nangka, Kakunir (Malay.); Salmonetti (Ambon); Lomottu (Menado); Tapa (Simalur); Lamun-lamun (Banjermassin); Nangka-nangka (Batjan).

Habitat: Penang Sea; Singapore; Banka; Sumatra (Benkulen, Padang, Ulakan, Priaman, Siboga, Tiku); Simalur!; Nias!; Java (Batavia, Prigi, Patjitan); Madura; Bawean; Bali; Sumbawa!; Timor; Borneo (Balikpapan Bay!; Sandakan); Celebes (Makassar!, Pare Pare!, Bonthain, Bulucomba, Badjoa, Menado!, Kema); Saleyer!; Siau!; Lirung, Salibabu Isl.!; Sangir; Obi-major; Buton!; Ambon!; Saparua; Ceram!; Batjan; Halmahera; Mysore; New Guinea. — Red Sea, Aden, Zanzibar, Mozambique, Natal coast, Delagoa Bay, Bourbon, Mauritius, Madagascar, Mayotte, Seychelles, British India, Ceylon, Southern China, Southern Japan, Formosa, Philippines, Australia (Endeavour Riv.), New Caledonia, Woodlark, Guam, New Britain, Tahiti, Borabora, Marquesas, Fiji Isl., Samoa. — In sea; the commonest species of Mullidae in the Archipelago, much valued as food-fish.

3. **Upeneus moluccensis** (Blkr.)

Upeneoides moluccensis Bleeker, Nat. Tijdschr. Ned. Indië VIII. 1855, p. 409.
Upeneoides moluccensis Günther, Cat. Brit. Mus. I. 1859, p. 309.
Upeneoides dubius Kner, Novara-Exp. Fische, 1865—67, p. 67 (nec Schlegel).
Upeneus moluccensis Bleeker, Révis. Mulloïdes, p. 8, Verh. Akad. Amsterdam XV. (1873) 1875. — Atl. ichthyol. IX. 1878, Pl. 392, fig. 1.
Upeneoides Moluccensis v. Martens, Preuss. Exp. Ost-Asien 1876, p. 387.

Upeneoides moluccensis Fowler, Journ. Acad. Nat. Sci. Philadelphia (2) XII. 1904, p. 530.
Upeneoides moluccensis Seale, Philipp. Journ. Sci. IX. 1914, p. 68.
Upenoides (*sic*) *moluccensis* Herre & Montalban, Philipp. Journ. Sci. XXXVI. 1928, p. 101.

D.^{1} VIII, D.^{2} I. 8; A. I. 6; L. l. 34 (+ 2); L. tr. $\begin{array}{c} 2^1/_2 \\ \hline 1 \\ \hline 5-6 \end{array}$.

Elongate, slender, dorsal and ventral profile equally convex; height 3.8 to about 4 in length; head somewhat longer, its rostro-dorsal profile evenly arched. Eye 3.7 to 4 in head, equal to flat interorbital space and conspicuously shorter than somewhat pointed snout, situated for its major part in anterior part of head and nearly touching profile of head. Mouth oblique; mandibula enclosed; maxilla with the hindmargin rounded, reaching to below first third of eye. Barbels reaching to behind hindborder of eye. Operculum with a spine. Gillrakers 14 on lower branch of first branchial arch and 6 lower rudimentary ones. Scales rather small, ctenoid; head scaly, praeorbital nearly naked. First dorsal acute, the first spine minute, the second the longest, about 1.4 in head, the following spines successively decreasing in size. Second dorsal and anal about equally high, concave, as long as postorbital part of head and half diameter of eye; base of both fins anteriorly scaly. Distance between first and second dorsal somewhat less than head without snout. Pectorals about 1.18 in head, somewhat longer than ventrals. Caudal deeply emarginate, the lobes pointed, the upper the longest, about equal to head. Colour in alcohol: back above lateral line brown or pinkish, whitish below, a yellow longitudinal band from eye to caudal; pectorals, ventrals and anal more or less yellowish; dorsal fins and upper lobe of caudal with faded coloured bands, top of upper caudal lobe posteriorly edged with black, the lower lobe posteriorly white edged. Length up to 143 mm.

Habitat: Nias!; Sumatra; Sumbawa; Celebes (Badjoa. Menado, Tanawanko); Ambon. — Southern China, Philippines,

4. **Upeneus tragula** Richards. [Fig. 75 p. 362].

Upeneus tragula Richardson, Rep. Ichth. China & Japan, Rept. 15th Meet. Brit. Assoc. Adv. Sc. 1845, p. 220.
Upeneoides variegatus Bleeker, Nat. & Geneesk. Arch. Ned. Indië (3) II. 1845, p. 528. — Percoïden, p. 64, Verh. Batav. Gen. XXII. 1849. — Achtste Bijdr. Ambon, p. 48, Act. Soc. Sc. Indo-Neerl. II. 1857.

Upeneoides tragula Günther, Cat. Brit. Mus. I. 1859, p. 398.
Upeneus tragula Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 234 (name only).
Upeneoides tragula Kner, Novara-Exp. Fische, 1865—67, p. 66.
Mullus tragula Playfair & Günther, Fish. Zanzibar, 1866, p. 40.
Upeneoides tragula Day, Proc. Zool. Soc. London 1870, p. 685.
Upeneus tragula Bleeker, Espèces Mulloïdes, p. 11, Verh. Akad. Amsterdam XV. (1873) 1875. — Atl. ichth. IX. 1878, Pl. 392, fig. 2.
Upeneoides tragula Macleay, Proc. Linn. Soc. N. S. Wales II. 1878, p. 350. — Descr. Cat. Austral. Fish. I. 1881, p. 102.
Upeneoides tragula Day, Fish. India 4°, 1878—1888, p. 121.
Upeneoides tragula Steindachner & Döderlein, Denkschr. Akad. Wien XLVIII. 1883, p. 22.
Upeneoides tragula Sauvage, Poiss. Madagascar, 1891, p. 218.
Upeneoides tragula Jordan & Evermann, Proc. U. S. Nat. Mus. XXV. 1902, p. 335.
Upeneus tragula Jordan & Seale, Proc. U. S. Nat. Mus. XXVIII. 1905, p. 782.
Upeneus tragula Smith & Pope, Proc. U. S. Nat. Mus. XXXI. 1906, p. 479.
Upeneus tragula Jordan & Seale, Bull. Bur. Fish. XXVI. (1906) 1907, p. 26.
Upeneus tragula Evermann & Seale, l. c. p. 88.
Upeneus tragula Snyder, Proc. U. S. Nat. Mus. XXXII. 1907, p. 100.
Upeneoides tragula Jordan & Richardson, Bull. Bur. Fish. XXVII. (1907) 1908, p. 260.
? *Pseudupeneus jeffi* Ogilby, Proc. Roy. Soc. Queensland XXI. 1908, p. 19.
Upeneoides tragula Seale, Philipp. Journ. Sci. V. 1910, p. 278.
Upeneus tragula Bean & Weed, Proc. U. S. Nat. Mus. XLII. 1912, p. 607.
Upeneus tragula M. Weber, Siboga-Exp. Fische, 1913, p. 293.
Upeneus tragula de Beaufort, Bijdr. Dierk. Leiden, 1913, p. 124.
Upeneoides tragula Fowler & Bean, Proc. U. S. Nat. Mus. LXII. 1922, p. 43.
Upeneoides tragula McCulloch, Check list fish. N. S. Wales, III. 1922, p. 86.
Upeneus tragula Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 583.
Upeneoides tragula Herre & Montalban, Philipp. Journ. Sci. XXXVI. 1928, p. 99.
Upeneoides tragula Fowler, Fish. Oceania, Mem. Bishop Mus. X. 1928, p. 227.
? *Upeneoides jeffi* Whitley, Rec. Austral. Mus. XVII. No. 3, 1929, p. 123.

D.^{1} VIII, D.^{2} I 7—8; A. I 6—7; L. l. 30 (+ 2 on caudal); L. tr. $\begin{array}{c} 2-2^1/_2 \\ \hline 1 \\ \hline 6 \end{array}$.

Elongate, slender, its greatest depth below spinous dorsal 4 to 4.25; head 3.2 to 3.5, much longer than high, its rostrofrontal profile strongly convex. Eye situated high up, about in middle of head, 4 to 4.75 in length of head, its diameter shorter than the nearly flat interorbital space and much shorter than blunt snout. Maxillary rounded posteriorly, extending to below anterior third of eye; mandibula slightly enclosed. Operculum with a weak spine. Praeorbital scaly; in young lower, in adult about equally high as diameter of eye. Gillrakers 11 to 12 and some rudimentary ones on lower branch of first branchial arch. Barbels almost reaching vertical through hindmargin of praeoperculum. Scales ctenoid, present also on praeorbital. First dorsal scarcely higher than second; its first spine minute, the second highest, 1.4 to 1.6 in head; its distance from second dorsal equals length of base of spinous dorsal. Second dorsal and anal equally high, concave, 1.5 to nearly twice in head. Pectorals somewhat shorter than ventrals, less than 1.5 in head. Caudal deeply forked, longer than head. Colour in alcohol reddish or brownish above, much lighter below; head and body covered with brown or blackish dots, a blackish lateral stripe from snout through eye to caudal; first dorsal with a broad black margin, second dorsal anteriorly clouded with black. Caudal with usually five oblique reddish or blackish bars, broader on lower lobe; pectorals, ventrals and anal with reddish bars or spots. Length 250 mm.

Nom. indig.: Bidjinangka karang, Kakumir (Malay.).

Habitat: Singapore!; Bintang; Riou Isl.; Duizend Isl,; Lepar Isl.; Banka; Biliton; Nias!; Sumatra; Java (Batavia); Madura; Bawean Isl.; Bali; Sumbawa!; Flores!; Borneo (Sandakan); Celebes (Makassar!, Badjoa, Bulucomba, Menado, Kwandang Bay!); Sangir Isl.; Kei Isl.!; Ambon; Ceram; Saparua; Batjan; Banda; Ternate; Obi major!; Halmaheira; Fau Isl.!; Goram; Waigeu; Misol; New Guinea!. — Aden, Zanzibar, Natal coast, Madagascar, British India, Ceylon, Andamans, Tonkin, Southern China, Southern Japan, Formosa, Philippines, Australia (P. Darwin, P. Jackson, N. S. Wales), Palm Isl., Pescadores.

5. **Upeneus sundaicus** (Blkr.).

Upeneoides sulphureus Bleeker, Percoiden p. 63, Verh. Batav. Gen. XXII. 1849. (nec C. V.).

Upeneoides sundaicus Bleeker, Nat. Tijdschr. N. Ind. VIII. 1855, p. 411 (name only in note). — op. cit. XII. 1856, p. 213 (name only). — Achtste Bijdr. Ambon p. 47, Acta Soc. Sc. Indo-neerl. II. 1857.

Upeneoides sundaicus Günther, Cat. Brit. Mus. I. 1859, p. 399.

Upeneus sundaicus Bleeker, Ned. Tijdschr. Dierk. II. 1865, p. 147.

Upenoides sundaicus Steindachner, Sitzb. Akad. Wien LX. (1869) 1870, p. 560.

Upeneus sundaicus Bleeker, Révis. Mulloides p. 10, Verh. Akad. Amsterdam XV. 1875. — Atl. ichth. IX. 1878, Tab. 394, fig. 2.

Upeneus sundaicus Evermann & Seale, Bull. Bur. Fish. XXVI. 1906, p. 88.

Upeneus sundaicus de Beaufort, Bijdr. Dierk. Leiden 1913, p. 123.

Upeneus sundaicus var. *caudalis* Popta, Zool. Meded. VI. 1921, p. 206.

Upeneoides sundaicus Herre & Montalban, Philipp. Journ. Sci. XXXVI. 1928, p. 98.

D.^{1} VIII, D.^{2} I 8; A. I 8; L. l. 33—35; L. tr. $\begin{array}{c}2^{1}/_{2}\\ \hline 1\\ \hline 6\end{array}$.

Oblong-elongate, slender, dorsal and ventral profile nearly equally convex; rostro-dorsal profile strongly ascending in a nearly straight line till eye, thence continued as slightly convex dorsal profile. Height 3.75 to 4.26 in length; head 3.5 to 3.8, longer than high. Eye 3.75 to 4.2 in head, situated nearly in middle of head, somewhat nearer to hindmargin of operculum than to vertical through end of snout, located high up, rather near dorsal profile; its diameter nearly equal to convex interorbital space, much shorter than somewhat pointed, convex snout. Mouth oblique; mandibula somewhat enclosed; maxilla rather narrow and slightly rounded behind, its terminal width equal to half diameter of eye; reaching vertical through frontborder of eye or to below anterior half of eye. Barbels rigid only at base, reaching hindborder of praeoperculum or nearly so. Gillrakers 13+3 rudimental ones on lower part of first branchial arch. Scales large, ctenoid, covering head, the praeorbital included, sensory tubes of lateral line arborescent. Spinous dorsal acute, higher than second dorsal, the first spine minute, the second strong, rigid, longest, slightly more or less than height of body, the following spines rapidly decreasing in size. Second dorsal and anal of nearly same height, about twice diameter of eye, slightly emarginate, anteriorly scaly till about half their height, their distance equal to base of spinous dorsal. Pectorals and ventrals subequal, somewhat longer than head without snout. Caudal almost equal to head, least height of caudal peduncle less than half its length. Colour in alcohol olivaceous or brown above, much lighter below, a narrow brown band from eye to caudal; second dorsal with traces of longitudinal stripes, broad oblique ones on upper lobe of caudal, posterior margin of lower lobe violet. Length 180 mm. [Specimen of BLEEKER's collection in Amsterdam Museum seen by us].

Nom. indig.: Bidjinangka (Malay. Batavia); Kunir, Kuniran (Javan., Madura).

Habitat: Singapore; Banka; Nias; Sumatra (Priaman, Siboga); Java (Batavia); Madura; Muna Island; Celebes (Makassar!, Tanette!, Bulucomba, Badjoa); Buru. — Philippines, Japan [Karoli]. In sea and mouth of rivers.

6. **Upeneus luzonius** Jord. & Seale.

Upeneus luzonius Jordan & Seale, Bull. Bur. Fish. XXVI. (1906) 1907, p 25.
Upeneoides luzonius Jordan & Richardson, op. cit. XXVII. (1907) 1908, p. 260.
Upeneoides luzonius Seale, Philippine Journ. Sci. V. 1910, p. 279.
Upeneoides luzonius Herre & Montalban, op. cit. XXXVI. 1928, p. 97.

Dorsal VIII—I, 8; anal I, 6; scales $2^1/_2$—32 to 34—$6^1/_2$.

Body moderately elongate, its greatest depth 3.8 to 3.9 times, head 3.3 to 3.4 times in length; the nearly flat interorbital space 3.6 to 3.7 times in head; eye located high up near upper profile of head and about midway between tip of snout and posterior margin of opercle, 4 to 4.4 times in head; snout 1.6 to 1.9 times in eye and about as long as maxillary which is 2.4 to 2.5 times in head and reaches posteriorly to almost below anterior rim of pupil; lower jaw slightly the shorter; teeth villiform in jaws, and on vomer and palate; 5 or 6 + 15 gillrakers on first arch, the longest about half the eye; the long slender barbels extend to a little beyond angle of the smooth preopercle; only a single spine at hind edge of opercle; head, including preorbital and maxillary, completely covered with scales; least depth of caudal peduncle 2.2 to 2.4 times in head. Spinous dorsal rather high, its first spine minute, the second highest, 3.4 to 4 times in length of body; second dorsal and anal of nearly the same height, 1.7 to 1.9 times in head; pectoral very slightly shorter than ventral, which is 1.3 to 1.5 times in head, the latter fin reaching to the vertical from axil of first dorsal; caudal about as long as head, 3.1 to 3.5 times in length of body. Alcoholic specimens are dull yellowish to yellowish brown, with a dark brown longitudinal band running from eye to caudal; a brown saddle over anterior half of caudal peduncle; a rather indistinct vertical band of the same color descends the side from the anterior two-thirds of the rayed dorsal; another brown band sometimes present below the spinous dorsal; dorsals clouded indistinctly with dusky, these markings oftentimes inconspicuous; each lobe of caudal crossed by six or more oblique dusky bands which are rather fine and about as wide as the interspaces; all the other fins yellowish, unmarked; no dusky spots visible on sides of head and body.

This species is here described from thirty-one examples, 57 to 105 millimeters long, coming from the Philippines and Borneo (Sandakan).

This species is very closely allied to *Upeneoides vittatus* (Forskål) from which it differs in the presence of brown transverse bands above the lateral line, in the absence of dusky spots on sides, and in having finer dusky crossbands on each lobe of caudal. In many alcoholic examples of this species, the color markings on the dorsals have faded.

Jordan and Seale had specimens from Cavite, caught in Manila Bay. A living specimen in the Bureau of Science aquarium was mostly gray in color, the longitudinal band and fin markings dusky, but it died before complete color notes could be taken. This small inconspicuous species is of no particular importance as a food fish. [Description after Herre & Montalban, not seen by us].

2. **Mulloidichthys** Whitley.

(Whitley, Studies in Ichthyology No. 3, Records Australian Museum XVII. 1829, p. 122).

Mulloides Bleeker, Percoiden p. 6, Verh. Batav. Gen. XXII. 1849[1]).

Elongate, slender, somewhat compressed; covered with finely ctenoid scales; lateral line concurrent with dorsal profile, with 35 to 40 sensory tubules, more or less branched, two or three extending on caudal. Head convex, scaly, with three oblique series of scales on cheeks. Snout more or less blunt, prolonged; maxillary not reaching eye in adult. Small teeth in jaws in narrow villiform bands, posteriorly often in a single series; no teeth on vomer and palatines. Operculum with a small flat spine. Soft dorsal and anal without scaly covering. For other characters see those of the family.

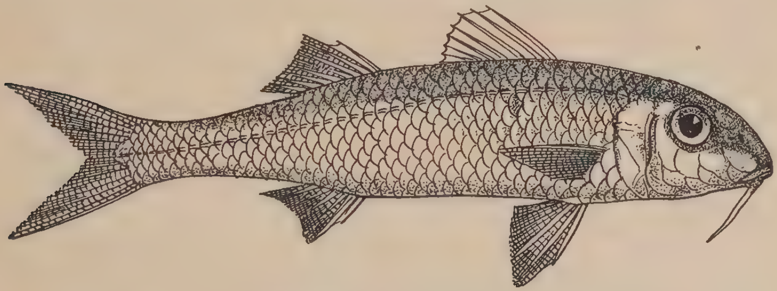

Fig. 76. *Mulloidichthys samoensis* Gthr. $^5/_9$ nat. size.

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[1]) Whitley (l. s. c.) has shown, that the name *Mulloides* Bleeker, 1849, is preoccupied by *Mulloides* Richardson, Rep. 12th Meeting Brit. Assoc. Adv. Sc. (1842) 1843, p. 16.

Distribution: Marine, littoral fishes of moderate size, living in all tropical seas, principally in the indo-pacific region. Much valued as food fish.

Key to the indo-australian species of Mulloidichthys.
(After alcohol specimens).

1. Uniform yellowish-white, back brownish, often a dark spot below lateral line, near end of pectoral. 1. *M. samoensis* p. 374.
2. Yellowish, head darker; caudal with a dark margin. 2. *M. vanicolensis* p. 375.
3. A yellow band from eye to caudal; fins yellowish; head often with red spots. . . . . 3. *M. auriflamma* p. 376.

1. **Mulloidichthys samoensis** (Gthr.) [Fig. 76 p. 373].

Mulloides samoensis Günther, Fische Südsee 1873—75, p. 57.
Mulloides samoensis Waite, Mem. Austral. Mus. III. 1899, p. 184.
Mulloides pflügeri Steindachner, Denksch. Akad. Wien LXX. 1900, p. 485.
Mulloides flavolineatus Seale, Occ. Papers Bishop Mus. I. 1901, p. 71 (nec Lacépède, fide Fowler).
Mulloides samoensis Seale, ibidem.
Mulloides flammeus Jordan & Everman, Bull. U. S. Fish. Comm. XXII. (1902) 1904, p. 186.
Mulloides samoensis Jordan & Evermann, l. c. XXIII. (1903) 1905, p. 253.
Mulloides pflugeri (*sic*) Jordan & Evermann, l. c. p. 251.
Mulloides flammeus Jordan & Evermann, ibidem.
Mulloides samoensis Jordan & Seale, Bull. Bur. Fish. XXV. (1905) 1906, p. 276.
Mulloides samoensis Steindachner, Sitzb. Akad. Wien CXV. 1906, p. 1386.
Pseudupeneus pleurospilos Seale, Occas. Papers Bishop Mus. IV. 1906, p. 51 (nec Bleeker, fide Fowler).
Mulloides samoensis Evermann & Seale, Bull. Bur. Fish. XXVI. (1906) 1907, p. 87.
Mulloides samoensis Kendall & Goldsborough, Mem. Mus. Comp. Zool. Harvard Coll. XXVI. 1911, p. 294.
Mulloides samoensis M. Weber, Siboga-Exp. Fische, 1913, p. 294.
Mulloides samoensis de Beaufort, Bijdr. Dierk. Leiden 1913, p. 124.
Mulloides samoensis Herre & Montalban, Philipp. Journ. Sc. XXXVI. 1928, p. 132.
Mulloides samoensis Fowler, Fish. Oceania, Mem. Bishop Mus. X. 1928, p. 234.

$D.^1$ VII—VIII, $D.^2$ I 8 — I 9; A. I 7; L. l. 35 + 2 — 3; L. tr. $\begin{array}{c}2^1/_2\\ \hline 1\\ \hline 6\end{array}$.

Oblong, compressed, rather slender, its greatest height through origin of spinous dorsal 4—4.5 in length; head 3.1—3.5, much longer than deep, with its rostro-dorsal profile evenly arched. Eye situated nearer to hindborder of operculum than to end of snout, 3.6—4.5 in head, its diameter much shorter than bluntly pointed snout and shorter than nearly flat interorbital space. Mouth small, mandibula included; operculum with a single spine; barbels nearly reaching vertical margin of praeoperculum. Teeth in jaws in a villiform band, none on vomer and palatines; gillrakers 18—20, the 3 lowest rudimentary, on lower part of first branchial arch. Scales rather large, finely ctenoid, wanting on top of snout; lateral line parallel with dorsal profile, about 40 perforated scales, 2 or 3 on caudal. Origin of spinous dorsal about halfway distance from end of snout to vertical through origin of soft dorsal; the longest spine less than twice in head; second dorsal and anal somewhat concave, both without scales. Pectorals and ventrals of nearly equal length, about 1.5 to 1.6 in length of head. The deeply forked caudal equal to or somewhat shorter than head. Colour in alcohol uniformly yellowish white, the back brownish; often a more or less obscure blackish spot immediately below lateral line near end of pectoral; fins hyaline. In life a yellow longitudinal stripe from eye to base of caudal, visible in alcohol specimens as a yellow line, a less distinct one above it and two or three similar lines below it and on cheeks. Length up to 325 mm.

Habitat: Simalur!; Ambon!; Salibabu Isl.!. — Philippines, Marianes, Samoa, Hawaii, Marquesas, Tahiti, New Hebrides, Pleasant Island.

Note: On the authority of Fowler (l. s. c.) we have brought under the synonymy of this species *M. pflügeri* Steindachner and *M. flammeus* Jordan & Evermann. About the lastnamed species Jordan and his collaborators have repeatedly declared, that it is probably the young of *pflügeri* Steind.

2. **Mulloidichthys vanicolensis** (C. V.)

Upeneus vanicolensis Cuvier & Valenciennes, Hist. Nat. Poiss. VII. 1831, p. 521.
Mulloides vanicolensis Bleeker, Nat. Tijdschr. Ned. Ind. IV. 1853, p. 601.
Mulloides vanicolensis Günther, Cat. Brit. Mus. I. 1859, p. 404.
Mulloides vanicolensis Bleeker, Rév. Mulloides p. 14, Verh. Akad. Amsterdam, XV. (1873) 1875. — Atl. ichth. IX. 1878, pl. 392, fig. 6.
Mulloides Vanicolensis Macleay, Proc. Linn. Soc. N. S. Wales, IV. (1879) 1880, p. 62.
Upeneus vanicolensis Smith & Swain, Proc. U. S. Nat. Mus. V. 1882, p. 131.
Mulloides vanicolensis Jordan & Evermann, Bull. U. S. Fish. Comm. XXIII. (1903) 1905, p. 254.
Mulloides vanicolensis Evermann & Seale, Bull. Bur. Fish. XXVI. (1906) 1907, p. 87.

Mulloides vanicolensis M. Weber, Siboga-Exp. Fische, 1913, p. 294.
Mulloides vanicolensis Jordan & Jordan, Mem. Carnegie Mus. X. 1922—25, p. 52.
Mulloides vanicolensis Herre & Montalban, Philipp. Journ. Sc. XXVI. 1928, p. 135.
Mulloides vanicolensis Fowler, Fish. Oceania, Mem. Bishop Mus. X. 1928, p. 234.

D.[1] VIII. D.[2] I 8; A. II 6; L. l. 35—37; L. tr. $\begin{array}{c}2^1/_2\\ \hline 1\\ \hline 6\end{array}$.

Elongate, slender, compressed; dorsal and ventral profile nearly equally convex, rostro-dorsal profile evenly arched; greatest depth below anterior part of spinous dorsal 3.6 to about 4 in length; head 3.4 to 3.8, much longer than high. Eye 3.2 to 3.5 in head, situated slightly nearer hindmargin of operculum than to end of snout; about equal to somewhat convex interorbital space and not much shorter than blunt snout. Mouth small, slightly oblique, jaws nearly equal. Maxillary terminating somewhat before frontborder of eye. Operculum with a small flat spine; barbels extending to hindmargin of praeoperculum. Gillrakers 14+4 rudimentary ones on lower part of first branchial arch. Small teeth in jaws in a narrow band, the outer somewhat enlarged, posteriorly in a single series. Scales ctenoid, wanting on frontpart of snout. First dorsal spine minute, the second and third subequal, the highest, about 1.4 in head, the following gradually decreasing in size. Second dorsal and anal equal, slightly concave, about twice in head. Pectorals and ventrals subequal, about 1.5 in head; caudal deeply forked equals length of head. Colour in alcohol yellowish, head darker, fins yellowish, caudal with a dark margin. Length up to 250 mm.

Habitat: Simalur!; Saleyer!; Ternate; Salibabu Isl.!; Binongka Isl.!; Siau Isl.!; Sangir Isl. — Philippines, Johnston Isl., Solomon Isl., Vanicolo, Hawaii. In the indo-australian Archipelago it is principally known from the north-eastern part and seems to be rare.

3. **Mulloidichthys auriflamma** (Forsk.).

Mullus auriflamma Forskål, Descr. Animal. 1775, p. 30.
Mullus flavolineatus Lacépède, Hist. nat. Poiss. III. 1801, p. 406.
Mullus aureovittatus Shaw, General. Zoology IV. Pisces, 1803, p. 618.
Upeneus flavolineatus Cuvier & Valenciennes, Hist. nat. Poiss. III. 1829, p. 456.
Upeneus zeylonicus Cuvier & Valenciennes, l. c. p. 459 1).
Upeneus auriflamma Cuvier & Valenciennes, l. c. p. 461.
Upeneus flavolineatus Rüppell, Neue Wirbelth. Fische, 1835, p. 101.

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1) Day (Fish. India 4°, 1878—88, p. 123) says: „Having examined Val.'s type of *Upeneus Zeylonicus* I consider it to be this (*M. flavolineatus* Lac.) species'

Upeneus flavolineatus Jenyns, Zool. Voy., Beagle 1842, p. 24.
Upeneus flavolineatus Bleeker, Nat. & Geneesk. Arch. Ned. Ind. II. (3) 1845, p. 527.
Mulloides flavolineatus Bleeker, Percoïden, Verh. Batav. Gen. XXII. 1849, p. 12.
Mulloides zeylonicus Bleeker, ibidem.
Hypeneus flavolineatus Cantor, Journ. Asiat. Soc. Bengal, XVIII. 1850, p. 1018.
Mulloides flavolineatus Bleeker, Nat. Tijdschr. Ned. Ind. III. 1852, p. 697.
Mulloides flavolineatus Günther, Cat. Brit. Mus. 1859, p. 403.
Mulloides flavolineatus Kner, Novara-Exp. Fische, 1865—67, p. 69.
Mullus flavolineatus Jouan, Mém. Soc. Sc. Nat. Cherbourg XIII. 1867, p. 252.
Mullus flavolineatus Playfair, Proc. Zool. Soc. London 1867, p. 853.
Mulloides auriflamma Klunzinger, Abh. zool. bot. Ges. Wien XX. 1870, p. 742.
Mulloides flavolineatus Günther, Fische Südsee, 1873—75, p. 56.
Mulloides flavolineatus Bleeker, Verh. Akad. Amsterdam XV. (1873) 1875, Révis. Mulloïdes, p. 15. — Atlas ichth. IX. 1878, Pl. 394, fig. 3.
Mulloides zeylonicus Bleeker, l. c. p. 16.
Mulloides flavolineatus Day, Fish. India 4°, 1878—88, p. 122.
Mulloides flavolineatus Macleay, Descr. Cat. Austral. Fish. I. 1881, p. 104.
Mulloides auriflamma Klunzinger, Fische Roth. Meer., 1884, p. 50.
Mulloides flavolineatus Günther, Proc. Zool. Soc. London, 1887, p. 658.
Mulloides zeylonicus Günther, ibidem.
Mulloides flavolineatus Sauvage, Poiss. Madagascar, 1891, p. 231.
Mulloides auriflamma Steindachner, Denkschr. Akad. Wien LXX. 1900, p. 485.
Mulloides samoensis Bryan & Herre, Occ. Papers Bishop Mus. II. (1902) 1903 p. 128 (fide Fowler).
Mulloides auriflamma Jenkins, Bull. U. S. Fish. Comm. XXII. (1902) 1904, p. 454.
Mulloides auriflamma Jordan & Evermann, Bull. U. S. Fish. Comm. XXIII (1903) 1905, p. 250.
Mulloides ruber Seale, Occ. Papers Bishop Mus. IV. 1906, p. 48 (nec Lacépède, fide Fowler).
Mulloides flammeus Seale, ibidem (nec Jordan & Evermann, fide Fowler).
Mulloides auriflamma Jordan & Seale, Bull. Bur. Fish. XXV. (1905) 1906, p. 276.
Upeneus queketti Gilchrist & Thompson, Ann. S. Afric. Mus. VI. 1908, p. 163.
Mulloides flavolineatus Snyder, Proc. U. S. Nat. Mus. XLII. 1912, p. 503.
Mulloides auriflamma Kendall & Radcliffe, Mem. Mus. Comp. Zool. Harvard Coll. XXXV. 1912, p. 123.
Mulloides auriflamma M. Weber, Siboga-Exp. Fische, 1913, p. 293.
Upeneus queketti Gilchrist & Thompson, Ann. Durban Mus. I. 1917, p. 365.
Mulloides auriflamma Fowler & Bean, Proc. U. S. Nat. Mus. LXII. 1922, p. 44.
Mulloides auriflamma Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 585.
Mulloides auriflamma Herre & Montalban, Philipp. Journ. Sci. XXXVI. 1928, p. 130.
Mulloides auriflamma Fowler, Fish. Oceania, Mem. Bishop Mus. X. 1928, p. 233 (see for references).

D.^{1} VIII, D.^{2} I 8; A. I 6—7; L. l. 36—38 (+ 3—4 on caudal); L. tr. $\begin{array}{c} 2-2^1/_2 \\ \hline 1 \\ \hline 6 \end{array}$.

Oblong, slender, compressed, greatest depth below anterior part of first dorsal, 3.5 to 4 in length; head 3.2 to 3.6, much longer than deep, its rostro-dorsal profile more or less convex, straight above eyes. Eye 3.5 to nearly 4 in head, nearer to hindmargin of operculum than to end of snout; snout in young equal to it, in adult nearly twice longer; flat interorbital space much broader than eye. Maxillary not reaching frontborder of eye; mouth small, oblique, the mandible slightly included; operculum with a small flat spine; barbels extending to hindmargin of praeoperculum. Teeth in jaws in villiform bands, posteriorly in a single row. Gillrakers about 15 and some rudimentary ones on lower branch of first branchial arch. Scales finely ctenoid, somewhat caducous, wanting on top of snout. Spinous dorsal high, first spine minute or obsolete, second and third spines subequal 1.4 to 1.5 in head; second dorsal and anal concave, subequal, about twice lower than depth of body. Pectorals as long as ventrals, about equal to longest dorsal spine. Caudal almost equals head. Colour grayish or brownish above, lighter below, a yellow band from eye to caudal, touching lateral line; fins yellowish-hyaline, in life often with red spots on side of head. Length up to 300 mm.

Nom. indig.: Bidjinangka (Malay.); Salmonet-wonga (Batjan).

Habitat: Penang Sea; Singapore; Cocos Isl.; Java (Batavia, Patjitan, Karangbollong); Timor; Celebes (Badjoa, Menado); Sangir Isl.; Ternate; Buru; Batjan; Ambon; Ceram!; Banda; New Guinea!. — Red Sea, Delagoa Bay, Natal coast, Madagascar, Bourbon, Mauritius, Seychelles, South Arabia, Muscat, British India, Andamans, Ceylon, China, Chinese Sea, Japan, Philippines, Australia, New Pommern, throughout the tropical Pacific.

3. **Parupeneus** Bleeker.

(Bleeker, Versl. Akad. Amsterdam (2) II. 1868, p. 344).

Oblong, more or less elongate and compressed, covered with large, ctenoid scales; lateral line with 28 to 30 scales, with more or less arborescent tubules, some of them continued on caudal. The three ventral series of scales between ventral and anal fins more or less bluntly carinate, most pronounced on the central series. Head usually large with prolonged snout, the anterior and posterior nostrils on each side accordingly far distant. Praeorbital naked; cheeks with three series of scales, scales reaching on snout often till anterior nostril. Eye rather small, situated generally in posterior part of head. Mouth nearly horizontal, low down, often with thick lips. Maxillary with its very broad rounded or truncate distal end far distant from eye. Barbels long, if rigid, only at their base. Comparatively strong, conical, unequal teeth in a single series in both jaws, none on vomer and palatines. Soft dorsal and anal without a scaly covering. For other characters see those of the family.

Distribution: Marine, littoral fishes attaining a medium or large size. Some entering mouth of rivers. Tropical fishes of the indo-pacific region, abundantly distributed through the indo-australian Archipelago; including some excellent food fish.

Note: In case one wishes to divide the original genus *Upeneus* of Cuvier in different genera, which is certainly recommendable, the name *Upeneus* must be restricted to *Upeneus vittatus* and kindred species, as it is the first species named by Cuvier & Valenciennes and explicitely placed in their first group „1°. Upenéus des Indes à dents en velours aux deux mâchoires, au vomer et aux palatins." By this characters it corresponds with *Upeneus* of Bleeker and differs essentially from *Parupeneus* Bleeker. Jordan & Evermann (Fish. N. & Middle America I. 1896, p. 857) have therefore erroneously canceled that name by treating it as a synonym of what they call *Upeneus*. Later on Jordan and his collaborators substituted for the genus *Upeneus*, as restricted above (according to Cuvier & Valenciennes), the name *Upeneoides* introduced by Bleeker in 1849 (Verh. Batav. Gen. XXII. 1849,

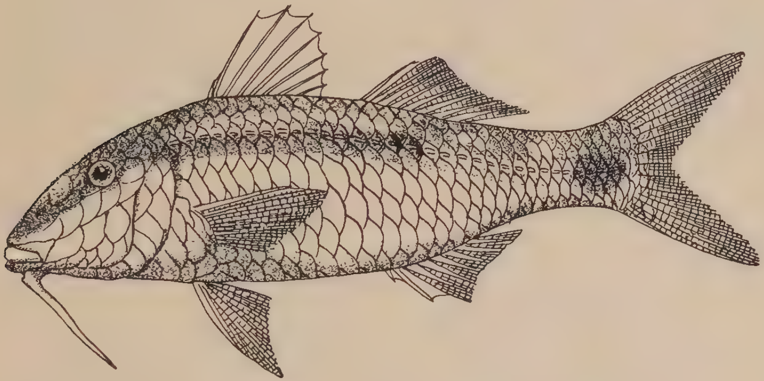

Fig. 77: *Parupeneus barberinus* (Lac.) $^5/_9$ nat. size.

Percoïden p. 64) but canceled by himself in 1865 on explicit reasons, as exposed in his article (Notice sur le *Parupeneus bifasciatus*, Versl. Akad. Amst. (2) II. 1868, p. 344) and replaced by *Upeneus* Cuv., a name used by Jordan and his collaborators for a group of *Mullidae* characterized by one row of teeth in jaws, while the roof of mouth is toothless. This seems to us erroneous and in direct opposition to the above quoted first group of *Upeneus* of Cuvier & Valenciennes. It corresponds entirely with *Parupeneus* Blkr., a name, used by Bleeker in different lists of fishes since 1863, but established for the first time in detail in the quoted article of 1868. We use therefore this name, as is already done by others f.i. Klunzinger, Steindachner, Pellegrin, Barnard, a.o. — *Pseudupeneus* created by Bleeker (Notice ichth. Versl. Akad. Amsterdam XIV. 1862, p. 133) for *Upeneus prayensis* C. V. and *Mullus maculatus* Bloch (*Up. maculata* C. V.) is an atlantic genus, with a dentition differing from that of the indo-pacific genus *Parupeneus*, as exposed again by Bleeker in Syst. Percarum II. Arch. Néerl. Sc. Nat. XI. 1876, p. 333.

Key to the indo-australian species of Parupeneus.

A. Second dorsal spine rigid and pungent.
I. Body with two or three brown crossbands.
1. Head acute, longer than high; terminal width of maxilla more than eye-diameter. Last dorsal and anal ray produced, longer than base of fins . . . . 1. *P. trifasciatus* p. 382.
2. Colour variety, see description. . . . . 2. *P. trifasciatus* var. *atrocingulatus* p. 385.
3. Head obtuse, as long as high; terminal width of maxilla less than eye-diameter. Last dorsal and anal ray not or nearly not produced, not longer than base of fins . . . 3. *P. bifasciatus* p. 386.
II. Body without transversal bands; a round black spot on caudal peduncle, situated in lateral line.
1. Barbels extending to hindborder of operculum. Caudal spot in middle of length of caudal peduncle; a broad black band from snout through eye to end of second dorsal. 4. *P. macronema* p. 388.
2. Barbels extending to hindborder of praeoperculum. Caudal spot beginning below end of second dorsal. Anterior half of body with three black bands followed by a yellow patch . . . . 5. *P. barberinoides* p. 390.

B. Second dorsal spine flexible, not pungent.

I. Body with two broad blackish vertical bands below bases of spinous and soft dorsal respectively. Head obtusely pointed, about as long as high. 6. *P. andrewsi* p. 391.

II. Caudal peduncle with a lateral black spot.

1. Black longitudinal band from snout through eye to below middle or last dorsal ray; black spot in lateral line near caudal . . 7. *P. barberinus* p. 392.

2. A lateral yellow oval patch for its major part above lateral line.

a. Eye about in middle of head; barbels not surpassing praeoperculum; distance between eye and snout in an oblique line twice diameter of eye; yellow patch small, below and behind posterior half of first dorsal. . . . . 8. *P. indicus* p. 394.

b. Eye totally in posterior half of head; barbels reaching hindborder of operculum; distance between eye and snout in an oblique line thrice diameter of eye; yellow patch large, below between origin of first dorsal and second dorsal. . . 9. *P. malabaricus* p. 395.

3. Beginning of tail above with a large yellow area; black spot above lateral line in middle between second dorsal and caudal; barbels reaching operculum . . . . 10. *P. spilurus* p. 397.

III. Caudal peduncle without a lateral black spot.

1. Flanks with a black spot.

a. A round black spot in lateral line below interspace between the two dorsals; behind it, for the major part somewhat above lateral line, an oblong yellow patch. . 11. *P. pleurostigma* p. 398.

b. A round dark spot below lateral line in the vertical through middle of first dorsal (faint in large specimens); three pearl coloured longitudinal bands from snout to operculum, the middle one crossing eye. 12. *P. pleurospilus* p. 399.

2. Without a black spot on tail or flanks.

a. Eye 5 times or less in head; body of uniform colour; head obtuse.

α. Eye nearer to hindmargin of operculum than to end of snout. Third dorsal spine 1.6 in head. Gillrakers 18 + 2 rudimental ones. . . . . 13. *P. luteus* p. 401.

β. Eye about in middle of head. Third dorsal spine somewhat longer than half length of head. Gillrakers 13 + 5 rudimental ones. . . . . 14. *P. janseni* p. 402.

γ. Not seen by us; see description . . 15. *P. crassilabris* p. 403.

b. Eye 5.3—6 times in head; a pale or bright saddle on caudal peduncle; head long, pointed. . . . . 16. *P. chryserydros* p. 404.

Doubtful species:

17. *P. bilineatus* p. 406.
18. *P. dispilurus* p. 407.
19. *P. cyclostomus* p. 407.

1. **Parupeneus trifasciatus** (Lac.) [Fig. 78, p. 383].

Mullus trifasciatus Lacépède, Hist. nat. Poiss. III. 1802, p. 404, Pl. 15, Fig. 3.
Upeneus trifasciatus Cuvier & Valenciennes, Hist. nat. Poiss. III. 1829, p. 468.
Upeneus trifasciatus Bleeker, Nat. Tijdschr. Ned. Indië II. 1851, p. 237.
Upeneus trifasciatus Günther, Cat. Brit. Mus. I. 1859. p. 407 (p. p.).
Parupeneus trifasciatus Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 234.
Upeneus trifasciatus Kner, Novara-Exp. Fische, 1865—67, p. 71.
Parupeneus multifasciatus Bleeker, Ned. Tijdschr. Dierk. IV. 1873, p. 142. — Révis. Mulloides p. 20, Verh. Akad. Amsterdam XV. 1875 (nec Quoy & Gaim.).
Mullus multifasciatus Jouan, Mém. Soc. Sc. nat. Cherbourg (2) XVII. 1873, p. 91 (nec Quoy & Gaimard).
Upeneus trifasciatus Günther, Fische Südsee 1873—75, p. 59, Pl. XLIV. Fig. B.
Upeneus multifasciatus Day, Fish. India 4°, 1878—88, p. 124 (nec Q. & G.).
Upeneus trifasciatus Macleay, Proc. Linn. Soc. N. S. Wales VII. 1882, p. 245.
Upeneus velifer Smith & Swain, Proc. U. S. Nat. Mus. 1882, p. 130 (fide Jenkins).
Upeneus trifasciatus Sauvage, Poissons Madagascar, 1891, p. 224, 515.
Upeneus trifasciatus Waite, Mem. Austral. Mus. III. 1899, p. 185.
Upeneus trifasciatus Fowler, Proc. Acad. Nat. Sci. Philadelphia 1900, p. 520.
Upeneus multifasciatus Seale, Occas. Papers Bishop Mus. I. 1901, p. 71.
Pseudupeneus multifasciatus Jenkins, Bull. U. S. Fish. Comm. (1902) 1904, p. 456 (nec Q. G.).
Pseudupeneus multifasciatus Jordan & Evermann, Bull. U. S. Fish. Comm. XXIII. (1903) 1905, p. 256.
Pseudupeneus moana Jordan & Seale, Bull. Bur. Fish. XXV. (1905) 1906, p. 274.
Pseudupeneus moana Jordan & Snyder, Proc. U. S. Nat. Mus. XXIX. 1906, p. 354.
Parupeneus trifasciatus Steindachner, Sitzb. Akad. Wien, CXV. 1906. p. 1386.
Pseudupeneus moana Snyder, Proc. U. S. Nat. Mus. XXXII. 1907, p. 89.
Pseudupeneus multifasciatus Kendall & Radcliffe, Mem. Mus. Comp. Zool. Harvard Coll. XXXV. 1912, p. 122.
Parupeneus trifasciatus M. Weber, Siboga-Exp. Fische, 1913, p. 295 (p. p.).
Upeneus multifasciatus Fowler & Bean, Proc. U. S. Nat. Mus. LXII. 1922, p. 44 (nec Q. G.).
Upeneus moana Herre & Montalban, Philipp. Journ. Sci. XXXVI. 1928, p. 124.
? *Upeneus multifasciatus* Fowler, Fish. Oceania, Mem. Bern. P. Bishop Mus. X. 1928, p. 228.

D.^{1} VIII, D.^{2} I 8; A. I 6—7; L. l. 28—30; L. tr. $\begin{array}{c}2\\\hline 1.\\\hline 6\end{array}$

Oblong, compressed, dorsal profile more convex than ventral, height 3.27 to 3.55 below origin of first dorsal; rostro-occipital profile nearly straight, slightly ascending and continued in convex but not elevated dorsal profile. Head acute, 2.9 to 3 in length, much longer than high, pointed. Eye rather small, 5.2 to 6.3 in head, much shorter than convex interorbital space, situated high up, at a distance from hindmargin of operculum about equal to one and a half eyediameter, and according to age, more than two or three diameters from vertical through end of snout. Snout long, pointed, 1.65 to 2.2 in length of head. Mouth small, nearly horizontal, lips thick, mandibula somewhat included. Maxilla rounded behind, its terminal width more than diameter of eye; its distance from vertical through frontborder of eye, equal to diameter of eye. Barbels nearly reaching base of ventrals. Gillrakers 27 to 28 on lower part of first branchial arch, the lowest small or rudimentary. Scales reaching nostrils, wanting on praeorbital. First dorsal spine minute, second rigid and pungent, shorter than third and fourth, which are subequal, 1.58 to 1.7 in head, and, when depressed, extending to origin of second dorsal. Interspace between both dorsals covered by two rows of scales, its length equal to one third of length of base of first dorsal. Second dorsal truncate, its height about thrice in length of head, the last ray produced, reaching caudal (in young specimens not so far); anal sligthly higher, its last ray not so far produced. Ventrals slightly less than length of head, in old specimens, longer than pectorals. Caudal shorter than head. Colour in alcohol more or less yellowish brown, lighter below, a more or less pronounced black patch below first dorsal, a similar band below interspace between first and second dorsal, a shorter but broader one below second dorsal, spreading on base of that fin and continued on last produced ray; on caudal peduncle superiorly a black blotch of different extension preceded

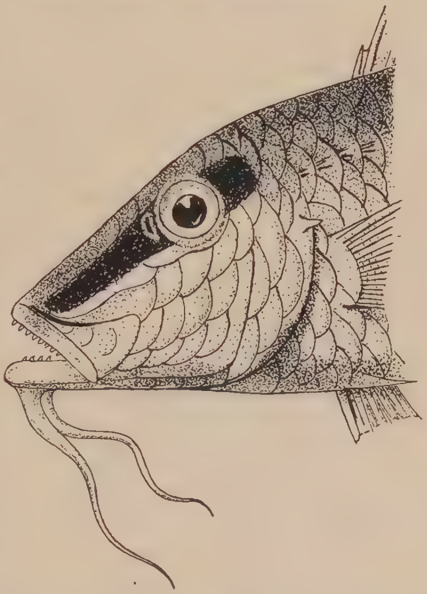

Fig. 78. Head of *Parupeneus trifasciatus* (Lac.). After Bleeker.

by a lighter patch, in fresh specimens yellow; a black band from snout to behind eye, which may be wanting before eye. Ventrals more or less dark, in life sometimes reddish or their posterior half with transverse bands; caudal with an inferior and superior dark margin. The colouration may be strongly faded. Length up to 230 mm.

Nom. indig.: Tijo (Menado); Bidjinangka (Ternate); Salmonetti (Ambon).

Habitat: Sulu!; Biaru!; Karkaralong!; Karakelang!; Salibabu (Lirung)!; Celebes (Badjoa, Menado!); Saleyer!; Timor; Flores; Halmahera; Ternate; Batjan; Obi-major; Ceram; Ambon!; Banda!; Goram; Aru; North New Guinea (Arso river!, Doreh). — Madagascar, Mauritius, British India, Ceylon, China, Riu Kiu, Okinawa, Philippines, Marianes, Carolines, Solomons, Polynesia, Hawaiian and Sandwich Islands.

Note: The validity of, and the proper application of references to the three species *bifasciatus* Lac., *trifasciatus* Lac. and *multifasciatus* Q. G., named by their respective authors: *Mullus bifasciatus* Lacépède (1802), *Mullus trifasciatus* Lacépède (1802) and *Mullus multifasciatus* Quoy & Gaimard (1824), is much confused, especially in later years. Jordan & Evermann (Bull. U.S. Fish. Comm. XXIII (1903) 1905, p. 256) using the name *Pseudupeneus multifasciatus* (Q. G.), quote in their synonymy „*Upeneus trifasciatus* C. V. (not of Lacépède)". This latter quotation is right, as *multifasciatus* Q. G, was by Cuvier & Valenciennes (Hist. nat. Poiss. III. 1829, p. 469) erroneously identified with *trifasciatus* Lac., while it is most probably identical with *bifasciatus* Lac. Bleeker (Notice sur le *Parupeneus bifasciatus*, Versl. Akad. Amsterdam (2) II. 1868, p. 342), it is true, partly accepted the assumption of Cuvier & Valenciennes and united *trifasciatus* C. V. with *multifasciatus* Q. G. being of opinion, that *trifasciatus* of Lacépède ought to be considered provisionally as a distinct species, till further studies should have decided about its validity. But Sauvage (Fishes of Madagascar 1891, p. 223), who had access to the type species of Quoy & Gaimard and of Cuvier & Valenciennes, adheres to the opinion, expressed above, that *multifasciatus* Q. G. ought to be united with *bifasciatus* Lac. A new error arose when Jordan & Seale (Fishes of Samoa, Bull. Bur. Fish, XXV. (1905) 1906, p. 274 wrote: „The name *trifasciatus* certainly belongs to *Pseudupeneus bifasciatus*, while that of *multifasciatus* was given to the common *moana* of the Hawaiian Islands." On the same page is recorded: „755. *Pseudupeneus bifasciatus* (Lacépède)" with the synonymy *Mullus bifasciatus* and *Mullus trifasciatus* Lacépède. Therefrom follows, that the joint authors consider the two species of Lacépède to be synonyms, an assumption already pronounced by Günther in his Catal. Brit. Mus. I, 1859, p. 407, where he united them under the name *Upeneus trifasciatus* Lac. But in 1875 he deliberately refuted that error and described in his „Südsee-Fische" *Upeneus bifasciatus* Lac. and *trifacsiatus* Lac. as different species. This same action was taken long before by Cuvier & Valenciennes who explicitely assert: „Nous les possédons l'une et l'autre. Ce sont deux espèces bien distinctes." And also Bleeker in his above quoted paper from 1868, tried to show, that they are different species. The same did Sauvage, who wrote a long, documented article about this question in his Fishes of Madagascar 1891. He says with some right: „Les auteurs de l'Histoire des Poissons ont eu tort de rapprocher l'espèce de Quoy & Gaimard du Mulle à trois bandes de Lacépède, et de là, sans doute, est venue la confusion commise par la plupart des auteurs." Steindachner (Sitzb. Akad. Wien CXV, 1906, p. 1387) again defended their specific distinction.

It seems that all these considerations of Cuvier & Valenciennes, Bleeker, Günther, Sauvage, Steindachner have been neglected by Jordan & Seale, wherefrom they were induced to maintain besides *bifasciatus* Lac. and *multifiasciatus* Q. G., a third species created in the same year by Jordan & Snyder and called *moana*, a name taken from the vernacular name at Samoa. Perhaps it is worthwhile to remember, that Cuvier & Valenciennes, while describing *trifasciatus*, remark that that fish is called „mouana" at the Sandwich Islands. The assumption of Jordan & Snyder and Jordan & Seale was without criticism accepted as correct by all American ichthyologists who wrote about the subject. We prefer, on the considerations explained above, to maintain *bifasciatus* Lac. and *trifasciatus* Lac. and unite with the latter *moana* Jord. & Snyder, as shown in our synonymy.

2. **Parupeneus trifasciatus** (Lac.) var. **atrocingulatus** Kner.

Upeneus trifasciatus (Lac.) var. Günther, Cat. Brit. Mus. I. 1859, p. 408.
Upeneus atrocingulatus Kner, in Steindachner & Kner, Sitzb. Akad. Wien LXI. 1870, p. 443.

Upeneus trifasciatus (Lac.) var. *atrocingulatus* Günther, Fische Südsee, 1873–75, p. 59, Taf. XLIV. Fig. C.
Upeneus atrocingulatus Sauvage, Poiss. Madagascar, 1891, p. 224.
Upeneus trifasciatus Seale, Occas. Papers Bishop Mus. I. 1901, p. 72.
Parupeneus trifasciatus (Lac.) var. *Upeneus atrocingulatus* Kner, Steindachner, Sitzb, Akad. Wien CXV. 1906, p. 1388.
Pseudupeneus atrocingulatus Jordan & Seale, Bull. Bur. Fish. XXV. (1905) 1906, p. 274.

„Kopflänge etwas die Körperhöhe übertreffend, 3mal in der Körperlänge enthalten. Das Auge steht circa $1\frac{1}{2}$ Diameter von Schnauzenrande entfernt. Augendiameter circa $\frac{1}{4}$, Schnauzenlänge $\frac{5}{12}$ der Kopflänge gleich. Die Barteln etwas weiter als das Präoperculum zurückreichend, Stirnbreite der Augenlänge gleich. Ein weisslicher Längsstreif schimmert unter den Schuppen vom seitlichen Kopfende bis unter das Ende der ersten Dorsale oder bis zum Beginne der zweiten Rückenflosse durch, und zwar auf der ersten Schuppenreihe über der Seitenlinie.

Den Rumpf umgürtet eine schwarze Querbinde, welche die ganze Breite der ersten Dorsale einnimmt. Ein schwarzer rundlicher Fleck unter dem Ende der zweiten Dorsale auf der Seitenlinie, welche 27—28 Schuppen durchbohrt. Wangen silberglänzend, erste Dorsale grauschwarz. Längs der zweiten Dorsale eine schmale dunkle Binde. Caudale hell, durchsichtig; Ventrale und Basis der Pectorale schwarz.

D. $8/\frac{1}{8}$; A. 7; Sq. lat. 27—28.

Habitat: Ambon (Günther). — Samoa, Friendly Isl. (Vavau). [After Kner].

Note: This form was first described by Günther as a variety of *Upeneus trifasciatus* (Lacépède). Kner gave it the specific name *Upeneus atrocingulatus*. Günther (Fische Südsee 1873, p. 59) maintained his former opinion and gave a good figure of what he supposed to be a colour-variety: an opinion accepted also by Sauvage and by Steindachner, who declared it to be a juvenile state of *U. trifasciatus*. Seale described it as *U. trifasciatus* (Lac.); Jordan & Seale again as a distinct species.

3. **Parupeneus bifasciatus** (Lac.)[1] [Fig. 79 p. 387].

Mullus bifasciatus Lacépède, Hist. nat. Poiss. III. 1802, p. 404, pl. 14, fig. 2.
Mullus multifasciatus Quoy & Gaimard, Voy. de Freycinet, 1824, p. 330, pl. LIX. Fig. 1.
Upeneus bifasciatus Cuvier & Valenciennes, Hist. nat. Poiss. III. 1829, p. 468.

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[1] About the application of this name and its synonymy see the note by the preceding species: *P. trifasciatus* Lac.

Upeneus trifasciatus Günther, Cat. Brit. Mus. I. 1859, p. 407 (p. p.).
Parupeneus bifasciatus Bleeker, Versl. Akad. Amsterdam (2) II. 1868, p. 345. — Rech. faune Madagascar, Poissons 1875, p. 40, Pl. 18, fig. 2.
Upeneus bifasciatus Günther, Fische Südsee 1873—75, p. 59, Taf. 44, Fig. A.
? *Upeneus semifasciatus* Macleay, Proc. Linn. Soc. N. S. Wales VIII. 1883, p. 263.
Upeneus bifasciatus Sauvage, Poiss. Madagascar 1891, p. 221.
? *Pseudupeneus bifasciatus* Bryan & Herre, Occas. Papers Bishop Mus. II. 1903, p. 128.
Pseudupeneus bifasciatus Jordan & Evermann, Bull. U. S. Fish. Comm. XXIV. (1903) 1905, p. 258.
? *Pseudupeneus bifasciatus* Jordan & Seale, Bull. Bur. Fish. XXV. (1905) 1906, p. 274.
? *Pseudupeneus semifasciatus* Jordan & Seale, l. c. p. 275 (After Macleay).
Parupeneus trifasciatus M. Weber, Siboga-Exp. Fische, 1913, p. 295 (p. p.).
Upeneus bifasciatus Herre & Montalban, Philipp. Journ. Sci. XXXVI. 1928, p. 118.
Upeneus bifasciatus Fowler, Fish. Oceania, Mem. Bern. P. Bishop Mus. X. 1928, p. 227.

D.[1] VIII, D[2]. I 8; A. I 6; L. l. 28; L. tr. $\begin{array}{c}2\\\hline 1.\\\hline 6\end{array}$

Oblong, compressed, height below origin of first dorsal 3 to 3.2 in length; rostro-occipital profile strongly ascending till eye with a concavity before it, thence elevated and arched till first dorsal and continued in dorsal profile which is much more convex than the somewhat straight ventral profile. Head obtuse, rather deep, about 3.20 in length; as long as high. Eye 4.7 to 5 in large specimens, situated high up, more than its own length distant from vertical through hindborder of operculum and more than twice its diameter distant from vertical through end of snout, which goes 1.7 to 1.9 in head and is bluntly rounded. Mouth small, nearly horizontal, the mandible included. Maxillary nearly truncate posteriorly, its terminal width nearly equal to eye, not reaching vertical through frontborder of eye and distant from it less than half length of eye. Operculum with a conspicuous spine. Barbels extending to vertical through hindmargin of operculum, not reaching second

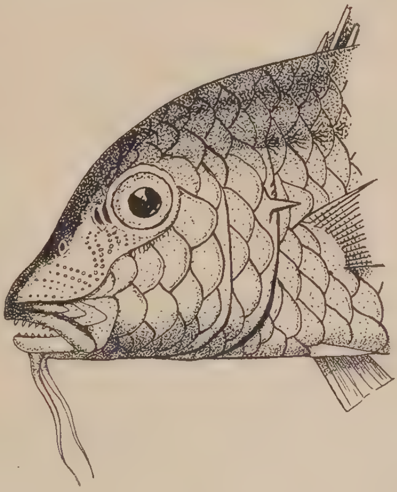

Fig. 79. Head of *Parupuneus bifasciatus* (Lac.). After Bleeker.

row of scales before ventrals. Gillrakers 25 on lower part of first branchial arch, the three or four lowest reduced. First dorsal elevated, the first spine minute, the second ridged and pungent, somewhat shorter than third and fourth, which are subequal, reaching second dorsal when depressed and go about 1.4 to 1.5 in head. The interspace between first and second dorsal is covered by only two scales, and is about equal to $^1/_4$ of the length of the base of the first dorsal. Second dorsal and anal truncate, the last ray not produced, not longer than preceding rays; second dorsal about thrice in length of head, somewhat lower than anal. Pectorals more or less than 1.3 in head; they are conspicuously shorter than rather long ventrals which extend to vent. Caudal nearly equalling head; least height of caudal peduncle, more than half its length. Colour in alcohol brownish with three blackish incomplete crossbands, one below each dorsal fin, the third on posterior half of caudal peduncle; a dark blotch behind eye. Second dorsal and anal faintly banded longitudinally, the other fins yellowish. Length 250 mm.

Habitat: Binongka Island!; Banda!. — Bourbon, Mauritius, Réunion, Madagascar, Philippines, Marcus Isl., Carolines, Solomons, Hawaiian Isl., Samoa, Rarotonga, Society Isl., Sandwich Isl.. In sea.

4. **Parupeneus macronema** (Lac.).

Mullus macronema Lacépède, Hist. nat. Poiss. III. 1802, p. 383, 404.

Mullus auriflamma Lacépède, l. c. p. 400 (nec Forsk.).

Upeneus lateristriga Cuvier & Valenciennes, Hist. nat. Poiss. III. 1829, p. 463.

Upeneus lateristriga Rüppell, Neue Wirbelth., Fische 1835—40, p. 101.

Upaeneus lateristriata Valenciennes in Cuvier, Règne Anim. Edit. de Luxe IV, 1836. Atlas. Tab. 19, Fig. 3 [1]).

Upeneus lateristriga Bleeker, Nat. Tijdschr. Ned. Indië VII. 1854, p. 242.

Upeneus lateristriga Peters, Monatsber. Akad. Berlin, 1855, p. 432.

Upeneus macronema Günther, Cat. Brit. Mus. I. 1859, p. 405.

Upeneus macronema Bleeker, Enumeratio Pisc. p. 37, Acta Soc. Sc. Indo-Neerl. VI. 1859.

Mullus micronemus Playfair in Playfair & Günther, Fish. Zanzibar, 1866, p. 40 [2]).

Upeneus macronemus Klunzinger, Abh. zool. bot. Ges Wien XX. 1870, p. 744.

Parupeneus macronema Bleeker, Révis. Mulloïdes p. 24, Verh. Akad. Amsterdam XV. (1873) 1875. — Atl. ichthyol. IX. 1878, Tab. 391, Fig. 3.

Upeneus macronemus Day, Fish. India 4°, 1878—88, p. 123.

Parupeneus macronema Klunzinger, Fische Roth. Meer. 1884, p. 51.

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1) In the text it is called *Upaencus lateristriata* on the plate *Upeneus lateristriga!*

2) Misprint for macronemus.

Upeneus macronemus Sauvage, Poiss. Madagascar, 1891, p. 224.
Parupeneus macronema Pfeffer, Jahresb. Hamburger wissensch. Anstalt. X. 1893, p. 9.
Parupeneus macronema Steindachner, Denkschr. Akad. Wien. LXXI. 1902, p. 138.
Parupeneus macronema Barnard, Ann. S. Afric. Mus. 1925—27, p. 587.
Upeneus macronemus Fowler, Fish. Oceania, Mem. Bishop Mus. X. 1928, p. 230.

D.^{1} VIII, D.^{2} I 8; A. I 7; L. l. 30—31; L. tr. $\begin{array}{c}2-2^1/_2\\ \hline 1\\ \hline 6-6^1/_2\end{array}$.

Oblong-elongate, compressed, both profiles nearly evenly convex; height below origin of first dorsal 3.20 to 3.50 in length; head 3 to 3.3, its rostro-frontal profile nearly straight. Eye 4.2 to nearly 5 in head, about twice nearer to hindmargin of operculum than to end of snout; situated near interorbital space which is slightly convex and somewhat broader than diameter of eye. Snout blunt, about twice longer than eye. Mouth almost horizontal, mandibula enclosed in broad intermaxillary. Maxilla rounded behind and as broad as diameter of eye and about half that diameter distant from frontborder of eye. Barbels extending to hindborder of operculum or nearly so; operculum with a small spine. Gillrakers 24 on lower part of first branchial arch. Scales large, ctenoid, covering head till nostrils; wanting on praeorbital. First spine of spinous dorsal minute, second strong and ridged, one third or nearly half length of third and fourth spines, which are subequal and go about 1.5 times in length of head. Second dorsal and anal equally high, 2.5 in head; anal slightly shorter than second dorsal; distance of last from first dorsal nearly half length of base of that fin. Both fins are truncate, the last ray the longest, sometimes reaching to caudal. Pectorals shorter than head and somewhat shorter than ventrals. Caudal about as long as head. Colour in alcohol grayish or brown above, yellow below, a broad black band from snout through eye to below end of second dorsal, followed by a round black spot on caudal peduncle, situated in 24th and 25th scale of lateral line; ventrals and anal and second dorsal with traces of coloured stripes, the second dorsal with a dark violet base, dorsal and ventral margin of caudal of similar colour, which easily fades; the last prolonged ray totally of that colour. Length reaches nearly 300 mm. 1)).

Nom. indig.; Kiau (Tapah, Simalur).

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1) We have specimens of 85 and 160 mm length from Sabang Bay, which lack the praeocular part of the longitudinal black band, as also described by Klunzinger.

Habitat: Sumatra (Priaman); Sabang!; Simalur!; Nias!; Celebes (Makassar); Ambon; Aru Isl.; New Guinea. — Red Sea, Sokotra, Zanzibar, Mossambique, Delagoa Bay, Madagascar, Bourbon, Mauritius, Muscat, British India, Ceylon, Tahiti, Hawaiian Islands.

5. **Parupeneus barberinoides** (Blkr.).

Upeneus barberinoides Bleeker, Nat. Tijdsch. Ned. Indië III. 1852, p. 263. — Elfde Bijdr. Ambon p. 33, Acta Soc. Sc. Indo-Neerl. VIII. 1860.
Upeneus barberinoides Günther, Cat. Brit. Mus. I. 1859, p. 406.
Parupeneus barberinoides Bleeker, Ned. Tijdschr. Dierk. II. 1865, p. 285.
Parupeneus barberinoides Bleeker, Révis. Mulloides p. 22, Verh. Akad. Amsterdam XV. (1873) 1875.
Pseudupeneus barberinoides Jordan & Seale. Bull. Bur. Fish. XXV. (1905) 1906, p. 276 (name only).
Pseudupeneus barberinoides Kendall & Goldsborough, Mem. Mus. Comp. Zool. Harvard College XXVI. 1911, p. 293.
Upeneus barberinoides Snyder, Proc. U. S. Nat. Mus. XLII. 1912, p. 501.
Upeneus barberinoides Herre & Montalban, Philippine Journ. Sci. XXXVI. 1928, p. 120.

D.^{1} VIII, D.^{2} I 8—9; A. I 6—7; L. l. 28—30; L. tr. $\frac{2^1/_2}{\frac{1}{6^1/_2}}$.

Oblong, compressed, dorsal and ventral profile evenly convex, the ventral profile behind ventrals even slightly more convex; rostro-dorsal profile convex. Height more or less than 3.3 in length, head 3 or less. Eye about 4.5 in head, shorter than convex interorbital space, in young situated in middle of head, in adult nearly totally in its posterior half, going more or less than 2.5 in length of convex snout. Mouth oblique, the jaws of same length. Maxilla rounded behind, its distal width more than twice its length, reaching vertical through middle of distance between anterior nostril and frontmargin of eye. Snout scaly above, praeorbital naked. Barbels extending to hindmargin of praeoperculum or slightly surpassing it and nearly reaching base of ventrals. Gillrakers 22—24 + 6—7 reduced ones on anterior branchial arch. Scales of lateral line with only slightly divided sensory tubes. First dorsal nearly twice higher than second; the first spine minute, the second pungent and thicker than the others, the third and fourth longest, more than one and a half in length of head. Second dorsal and anal subequal, obtuse, not emarginate, the last ray longest, going more than twice in length of head. Distance between dorsal fins less than half length of base of first, containing about two and a half scales. Pectorals shorter than ventrals, which go more or less than 1.3 times in length of head and extend to anus. Caudal little shorter than head; the least height of caudal peduncle about twice shorter than its length. Colour reddish above, lighter below, a narrow black band running along back from snout to end of soft dorsal; below it a broader band from snout through eye to about below distance between the two dorsal fins; here it joins a longitudinal black patch running from below eye through base of pectoral and is followed by a yellow patch, which touches again a small round black spot below end of second dorsal; that fin has a dark base and some longitudinal stripes, also present on the anal; caudal in adult with the inferior margin violet or blackish. This is the principal pattern of this multicolourous fish, whose fins are gaudy coloured in life. Lengt 185 mm.

Habitat: Celebes (Makassar!, Bulucomba); Ternate; Ambon; Ceram; New Guinea (Macleay). — Philippines, Okinawa, Tonga Islands (Kendall & Goldsborough).

6. **Parupeneus andrewsi** Reg.

Parupeneus andrewsii C. Tate Regan, Proc. Zool. Soc. London 1909, p. 403.

Depth of body a little more than the length of head, which is $3^1/_4$ in the length of the fish. Interorbital region very convex, its width $3^1/_4$ in the length of head; diameter of eye 6 in length of head; lips thick; barbels a little more than $^1/_2$ the length of head; 25 gill-rakers on the lower part of the anterior arch. 31 scales in a longitudinal series; tubules of lateral line much branched. Dorsal VIII, 9; second spine slender, flexible, not stronger than the others; third longest, $^3/_5$ the length of head; last soft ray moderately produced. Anal I, 7, the spine very small. Pelvics a little longer than the pectorals $^2/_3$ the length of head. Caudal peduncle nearly twice as long as deep. Reddish, with two broad blackish vertical bands below the bases of the spinous and soft dorsal fins respectively; snout dark bluish; spinous dorsal blackish; soft dorsal blackish at the base and with somewhat oblique stripes superiorly; anal with similar stripes.

A single specimen, 270 mm. in total length. From allied species with a somewhat similar coloration *P. andrewsii* is distinguished by having the second dorsal spine slender and flexible. Dr. Pellegrin has kindly examined the specimens in the Paris Museum described by Cuvier and Valenciennes as *P. bifasciatus* and *P. trifasciatus*, all of which have a strong, pungent second dorsal spine [1]), as have the specimens in the British Museum referred to those species. *P. bifasciatus*, in most respects the nearest to *P. andrewsi*, differs also in that the last ray of the second dorsal is the shortest instead of the longest (Bleek. & Pollen, Fauna Madagsc., Poiss. pl. XVIII. fig. 2). [After C. Tate Regan; not seen by us].

Habitat: Christmas Island.

7. **Parupeneus barberinus** (Lac.). [Fig. 77 p. 379].

Mullus barberinus Lacépède, Hist. nat. Poiss. III. 1802, p. 406.
Upeneus barberinus Cuvier & Valenciennes, Hist. nat. Poiss. III. 1829, p. 340.
Upeneus barberinus Bleeker, Nat. Tijdschr. Ned. Ind. II. 1851, p. 172.
Upeneus barberinus Montrouzier, Ann. Sc. phys. Soc. d'Agricult. Lyon (2) VIII. 1856, p. 431.
Upeneus barberinus Günther, Cat. Brit. Mus. I. 1859, p. 405.
Parupeneus barberinus Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 234.
Upeneus barberinus Kner, Novara-Exp. Fische, 1865—67, p. 70.
Mullus barberinus Playfair, in Playfair & Günther, Fish. Zanzibar, 1866, p. 40.
Upeneus barberinus Klunzinger, Abh. zool. bot. Ges. Wien XX. 1870, p. 745.
Upeneus barberinus Günther, Fische Südsee 1873—75, p. 57.
Parupeneus barberinus Bleeker, Révis. Mulloïdes p. 25, Verh. Akad. Amsterdam XV. (1873) 1875. — Atl. ichth. IX. 1878, Tab. 393, Fig. 1.
Upeneus barberinus Day, Fish. India, 4°, 1878—88, p. 124.
Upeneus barberinus Macleay, Descr. Cat. Austr. Fish. I. 1881, p. 105.
Parupeneus barberinus Klunzinger, Fische Roth. Meer. 1884, p. 52.
Upeneus barberinus Nyström, Bihang Svenska Akad. Handl. Stockholm XIII. 1887, p. 17.
Parupeneus barberinus Pfeffer, Jahrb. Hamburg. wisschensch. Anstalt. X. 1893, p. 9.
Pseudupeneus barberinus Seale, Occas. Pap. Bishop Mus. IV. 1906, p. 49.
Pseudupeneus barberinus Jordan & Seale, Bull. Bur. Fish. XXV. (1905) 1906, p. 276.
Parupeneus barberinus Steindachner, Sitzb. Akad. Wien CXV. 1906, p. 1388.
Pseudupeneus barberinus Jordan & Seale, Bull. Bur. Fish. XXVI. (1906) 1907, p. 25.
Pseudupeneus barberinus Evermann & Seale, l. c. p. 88.
Pseudupeneus barberinus Snyder, Proc. U. S. Nat. Mus. XXXII. 1907, p. 92.
Parupeneus barberinus M. Weber, Siboga-Exp. Fische, 1913, p. 296.
Upeneus barberinus Fowler & Bean, Proc. U. S. Nat. Mus. LXII. 1922, p. 44.
Parupeneus barberinus Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 588.
Upeneus barberinus Herre & Montalban, Philipp. Journ. Sci. XXXVI. 1928, p. 109.
Upeneus barberinus Fowler, Fish. Oceania, Mem. Bishop Mus. X. 1928, p. 230.

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1) This was clearly seen in Lacépède's type of *P. bifasciatus*.

D.^{1} VIII, D.^{2} I 8; A. I 6; L. l ca. 30; L. tr. $\begin{array}{c}2^1/_2\\ \hline 1\\ \hline 6\end{array}$.

Oblong, elongate, height somewhat more than 3 to 3.50 in length; head about 3, longer than high, rostro-dorsal profile straight or somewhat concave before eye. Eye 4.50 to 6.5 in head, in old specimens situated totally in posterior half of head, its distance from hindmargin of operculum twice its diameter, that from vertical trough end of snout more than twice. Eye much shorter than convex interorbital space. Snout pointed, long, about thrice diameter of eye. Mouth small, nearly horizontal, jaws of equal length; maxilla with its posterior end rounded, much less high than diameter of eye. Operculum with a conspicuous spine. Barbels extending to angle of praeoperculum, in young not so far. Gillrakers about 17 on lower branch of first branchial arch. Scales large, weakly ctenoid, reaching to nostrils, wanting on praeorbital; sensory tubes in lateral line strongly arborescent. First dorsal with the first spine minute, the second flexible, in very old specimens longest, when depressed reaching on second dorsal, usually subequal to third and fourth spines, the third somewhat the longest 1.4 to 1.8 in head. Second dorsal and anal subequal, slightly emarginate, more or less than 2.5 in head, the last ray not prolonged. Pectorals about as long as ventrals, 2.5 in head. Caudal shorter than head. Colour in alcohol brownish, lighter or reddish below, a black longitudinal stripe from snout through eye to middle or last dorsal rays; a round or oval black spot near caudal, occupying the 26th, 27th, and 28th scales of lateral line; head ornamented above and below eye with yellow, which easily fades. Length up to 500 mm.

Nom. indig.: Bidjinangka karang (Malay.), Lumato (Menado).

Habitat: Sabang Bay!; Sumatra (Trussan, Padang); Nias!; Java (Batavia, Anjer); Cocos Isl.; Bawean; Bali; Paternoster Isl.!; Timor; Letti; Celebes (Makassar!, Badjoa, Menado!, Gorontalo); Sulu Isl.!; Biaru!; Siau!; Karkaralong Isl.!; Binongka!; Buton!; Ternate; Halmahera; Buru; Ambon!; Ceram; Banda; Kei Isl.!; Aru Isl.; New Guinea!; Biak Isl.!. — Red Sea, Zanzibar, Delagoa Bay, Madagascar, Seychelles, British India, Andamans, Southern Japan (Riu Kiu Isl., Okinawa), Philippines (Cebu), Australia, Admirality Isl., St. Matthias, Woodlark, Solomons, Carolines, Kingsmill-, Pelew-, Hervey-, Samoa-, Society-, Tonga-, Paumotu Islands. In sea.

8. **Parupeneus indicus** (Shaw).

Mullus indicus Shaw, Gen. Zoology IV. 2, 1803, p. 614.
Upeneus Russelli Cuvier & Valenciennes, Hist. nat. Poiss. III. 1829, p. 465.
Upeneus waigiensis Cuvier & Valenciennes, l. c. p. 466.
Upeneus indicus Richardson, Rep. Ichth. China & Japan, Rep. 15th. Meet. Brit. Assoc. (1845) 1846, p. 220.
Upeneus Russelli Bleeker, Percoïden, p. 62, Verh. Batav. Gen. XXII. 1849 (name only).
Upeneus waigiensis ibidem (name only).
Upeneus indicus Günther, Cat. Brit. Mus. 1859, p. 406.
Upeneus indicus Bleeker, Ned. Tijdschr. Dierk. I. 1863, p. 152.
Parupeneus Russelli Bleeker, l. c. p. 234.
Upeneus indicus Day, Fish. Malabar, 1865, p. 28.
Parupeneus indicus Bleeker, Ned. Tijdsch. Dierk. II. 1865, p. 285. — Révis. Mulloïdes p. 27, Verh. Akad. Amsterdam XV. (1873) 1875. — Atl. ichthyol. IX. 1878, Tab. 394, fig. 5.
Upeneus indicus Günther, Fische Südsee, 1873—75, p. 57.
Upeneus Indicus Day, Fish. India 4°, 1878—88, p. 126.
Upeneus indicus Fowler, Proc. Acad. Nat. Sc. Philadelphia 1900, p. 526.
Upeneus indicus Jordan & Evermann, Proc. U. S. Nat. Mus. XXV. 1902, p. 334.
Pseudupeneus indicus Jordan & Seale, Bull. Bur. Fish. XXV. (1905) 1906, p. 276. — l. c. XXVI. (1906) 1907, p. 25.
Pseudupeneus indicus Evermann & Seale, Bull. Bur. Fish. XXVI. 1906, p. 88.
Pseudupeneus indicus Snyder, Proc. U. S. Nat. Mus. Wash. XXXII. 1907, p. 93.
? *Upeneus indicus* Gilchrist & Thompson, Ann. S. Afric. Mus. VI. 1908, p. 164.
Pseudupeneus indicus Franz, Japan. Knochenfische 1910, p. 48.
Upeneus indicus Snyder, Proc. U. S. Nat. Mus. XLII. 1912, p. 502.
Parupeneus indicus M. Weber, Siboga-Exp. Fische, 1913, p. 296.
Parupeneus indicus de Beaufort, Bijdr. Dierk. Leiden, 1913, p. 124.
Parupeneus indicus Pellegrin, Bull. Soc. Zool. France XXXIX. 1914, p. 227.
Parupeneus indicus Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 589.
Upeneus indicus Herre & Montalban, Philipp. Journ. Sci. XXXVI. 1928, p. 115.
Upeneus indicus Fowler, Fish. Oceania, Mem. Bernice P. Bishop Mus. X. 1928 p. 230.

D.^{1} VIII, D.^{2} I. 8; A. I. 7; L. l. about 30; L. tr. $\begin{array}{c}2^1/_2\\ \hline 1\\ \hline 6^1/_2\end{array}$.

Oblong, dorsal profile somewhat more convex than ventral, height below origin of first dorsal 3.50 to 3.75 in length; head about 3.3, somewhat longer than high, its rostro-dorsal profile convex, before eye somewhat straight to slightly concave. Eye 4.50 to 4.80 in head, situated near dorsal profile, about in middle of head, one and a half time its diameter distant from hindmargin of operculum and twice its diameter distant from vertical through end of snout; its diameter somewhat shorter than convex interorbital space. Mouth oblique, mandibula enclosed; snout pointed, its length, measured from frontborder of eye to end of snout, much more than twice length of eye. Maxilla slightly convex behind, more than half length of eye distant from vertical through frontborder of eye. Barbels extending to about hindmargin of praeoperculum. Gillrakers 18 on lower branch of first branchial arch, the last three rudimentary. Scales large, covering head till nostrils, wanting on praeorbital; sensory tubes of lateral line more or less arborescent. First dorsal acute, much higher than second. First spine minute, second somewhat shorter than third and fourth, which are subequal and about 1.5 in length of head. Second dorsal and anal subequal, posteriorly emarginate; longest ray 2.3 in head, the last ray not prolonged. Pectorals about 1.25 in head, ventrals of almost similar length. Caudal shorter than head. Least height of caudal peduncle about twice in its length. Colour in alcohol brownish with a yellow or lighter abdomen, an oval yellow spot above lateral line below and behind posterior half of first dorsal, an oval black spot in lateral line on posterior half of caudal peduncle; longitudinal stripes on second dorsal, traces of them on anal. Yellow, blue margined stripes radiating from eye and below it, which easily fade. Length up to 285 mm.

Nom. indig.: Bidjinangka-karang (Malay.).

Habitat: Biliton; Batu Isl.; Nias; Sumatra (Telokbetong, Kauer, Benkulen, Padang, Siboga); Java (Prigi, Patjitan, Karangbollong); Bali; Paternoster Isl.!; Celebes (Makassar!, Badjoa; Menado); Timor; Batjan; Ternate; Buru; Ceram; Ambon!, Waigeu. — Zanzibar, Delagoa Bay, Natal, Madagascar, Bourbon, Muscat, British India, Andamans, Ceylon, Southern China, Southern Japan (Riu Kiu Isl., Okinawa), Formosa, Philippines, Samoa, Tonga Isl., Fidji Islands. In sea.

9. **Parupeneus malabaricus.** (C. V.)

Upeneus malabaricus Cuvier & Valenciennes, Hist. nat. Poiss. III. 1829, p. 467.
Upeneus malabaricus Bleeker, Nalez. ichth. Fauna Bengalen, p. 34, Verh. Batav. Gen. XXV. 1853, (name only).
Upeneus malabaricus Günther, Cat. Brit. Mus. I. 1859, p. 407.
Upeneus malabaricus Day, Fish. Malabar, 1865, p. 29.
Mullus malabaricus Playfair, in Playfair & Günther, Fish. Zanzibar, 1866, p. 41.
Upeneus griseofrenatus Kner, Sitzb. Akad. Wien. LVIII. 1868, p. 27 & p. 305.

Upeneus malabaricus Günther, Fische Südsee, 1873—75, p. 58.
Upeneus malabaricus Macleay, Descr. Cat. Austral. Fish. I. 1881, p. 105. — Proc. Linn. Soc. N. S. W. VII. 1882, p. 245.
Upeneoides malabaricus Fowler, Journ. Acad. Nat. Sci. Philadelphia (2) XII. 1904, p. 530 (name only).
Parupeneus malabaricus M. Weber, Siboga-Exp. Fische, 1913, p. 297 (name only).
Upeneus malabaricus Duncker & Mohr, Mitt. Zool. Staatsinst. Hamburg XLIV 1929, p. 66.

$D.^1$ VIII, $D.^2$ I 8; L. l. 29—31; L. tr. $\begin{array}{c} 2^1/_2 \\ \hline 1 \\ \hline 6^1/_2-7 \end{array}$.

Oblong, anteriorly convex, somewhat tapering from first dorsal, where the height is somewhat more or less than 3.50 in length; head slightly longer, longer than high, its rostro-dorsal profile convex. Eye more or less than 5 times in head, situated high up, near dorsal profile, in posterior half of head, about twice its diameter from hindmargin of operculum and about thrice from vertical through end of snout; almost one third shorter than strongly convex interorbital space. Snout bluntly convex. Mouth oblique, mandibula enclosed. Barbels extending nearly to hindmargin of operculum. Maxilla truncate behind, its distance from vertical through frontborder of eye almost equal to length of eye. Operculum with a flat spine. Gillrakers 18 to 20, on lower part of first branchial arch, the 5—6 lowest small or rudimentary. Scales large, ctenoid, reaching on head to nostrils; praeorbital naked; sensory tubes of lateral line arborescent. Spinous dorsal acute, first spine minute, third the longest, 1.5 to 1.6 in head. Second dorsal and anal slightly emarginate, their anterior height subequal, about twice in head, the last ray somewhat prolonged. Distance between first and second dorsal nearly half length of base of first dorsal. Pectorals and ventrals of equal length, about $^3/_4$ of length of head. Caudal shorter than head. Least height of caudal peduncle half length of it. Colour in alcohol brownish or reddish; between origin of first dorsal and second dorsal a large yellow oblong patch, its major part situated above lateral line; on caudal peduncle a black blotch occupying 25th to 27th or 24th to 26th scale of lateral line, the lower third situated below that line; on praeorbital a bluish gray broad band. Fins hyaline. Length up to 268 mm.

Habitat: Sumatra; Rotti!; Buton!; New Guinea. — Aden, Zanzibar, Madagascar, British India, Australia, (Cape Grenville), Fidji Isl., Samoa Isl., Tonga Isl. In sea.

Note: We suppose, that this fish is repeatedly confounded with *P. indicus* (Shaw). One of us (Siboga Exped. p. 297) has stated, that Günther (Fische Südsee p. 58) was the first to show the difference between the two species. In *indicus* the eye is situated about in the middle of the head and the barbels do not surpass the praeoperculum; in *malabaricus* the eye is located totally in the posterior part of the head and the barbels extend to the hindborder of the operculum or nearly so. We find again these differences in the fullgrown specimens used for our diagnoses. In *indicus* the distance between eye and snout, measured in an oblique line, is twice the diameter of the eye, in *malabaricus* thrice, while the eye of both species is about of equal length. In *malabaricus* the rostro-dorsal profile is throughout convex, in *indicus* before the eye straight or even somewhat concave. In *indicus* the head is ornamented by yellow lines radiating from eye and below it, in *malabaricus* they are wanting but the praeorbital has a grayish band between mouth and eye.

10. **Parupeneus spilurus** (Blkr.).

Upeneus spilurus Bleeker, Nat. Tijdschr. Ned. Indië VI. 1854, p. 395. — Nalez. Japan. p. 68, Pl. II. fig. 2 (in Verh. Batav. Gen. XXVI. 1854—57.
Upeneus spilurus Günther, Cat. Brit. Mus. I. 1859, p. 406.
Upeneus spilurus Bleeker, Versl. Akad. Amsterdam XV. 1863, p. 447.
Upeneus spilurus Day, Proc. Zool. Soc. London 1870, p. 684.
Parupeneus spilurus Bleeker, Arch. Néerl. Sc. Nat. XIII. 1878, p. 63. — Enum. Poiss. Japon p. 10, Verh. Akad. Amsterdam XVIII. 1879.
Upeneus spilurus Jordan & Snyder, Prelim. Check List. 1901, p, 84.
Pseudupeneus spilurus Evermann & Seale, Bull. Bur. Fish. XXVI. (1906) 1907, p. 88.
Pseudupeneus spilurus Snyder, Proc. U. S. Nat. Mus. XXXII. 1907, p. 91.
Upeneus spilurus McCulloch, Checklist Fish. N. S. Wales III. Austral. Zoolog. II. Prt. III. 1922, p. 86.
Upeneus spilurus Herre & Montalban, Philippine Journ. Sci. XXXVI. 1928, p. 117.

$D.^1$ VIII. $D.^2$ I. 8—9; A. II. 6—7; L. l. 28—30; L. tr. $\begin{array}{c}2\\ \hline 1.\\ \hline 6\end{array}$

Oblong compressed, dorsal profile arched from snout to caudal peduncle, ventral profile nearly straight to anus; height 3 in length; head 3.2—3.5, longer than heigh, its rostro-frontal profile arched with a concavity. Eye 4—5.5, shorter than slightly convex interorbital space, situated rather high up about in middle of head. Snout pointed, about twice longer than eye-diameter. Mouth oblique, mandibula enclosed, lips thick; maxilla rounded behind, terminating before or below anterior margin of eye. Barbels slightly rigid only at their base, reaching to operculum or nearly surpassing it. Gillrakers 6 + 23 on first branchial arch. Scales wanting on praeorbital, covering snout and maxilla, often deeply embedded; those of lateral line with arborescent sensory tubes, especially the posterior ones. First dorsal much higher than second, but much lower than height of body; first spine minute, second not or nearly not pungent, not thicker than the succeeding, the third the longest; second dorsal and anal subequally high, about twice lower than height of body, anteriorly higher than posteriorly, the last ray not produced; anal shorter than soft dorsal with two not stiff spines. Pectorals and ventrals subequal, not or nearly not shorter than head without operculum. Caudal somewhat shorter than head, least height of caudal peduncle about half its length. Colour above reddish, the sides and below more pearl-coloured, beginning of tail above with a large yellow area; in middle between soft dorsal and caudal, above lateral line, a round blackish spot; fins yellowish or reddish. Length 300 mm. [Not seen by us].

Habitat: New Guinea. — Andamans, Philippines, Southern Japan, Australia.

11. **Parupeneus pleurostigma** (Bennett.)

Upeneus pleurostigma Bennett, Proc. Zool. Soc. London, 1831, p. 59.
Upeneus Brandesii Bleeker, Nat. Tijdschr. Ned. Indië II. 1851, p. 236.
Upeneus brandesii Günther, Cat. Brit. Mus. I. 1859, p. 407.
Parupeneus Brandesi Bleeker, Ned. Tijdschr. Dierk. II. 1865, p. 285.
Mullus pleurostigma Playfair, in Playfair & Günther, Fish. Zanzibar 1866, p. 40.
Upeneus pleurostigma Günther, Fische Südsee, 1873—75, p. 58.
Parupeneus pleurostigma Bleeker, Révis. Mulloïdes, p. 29, Verh. Akad. Amsterdam XV. (1873) 1875. — Atl. ichthyol. IX. 1878, Tab. 393, Fig. 3.
Upeneus pleurostigma Sauvage, Poiss. Madagascar, 1891, p. 229.
Parupeneus pleurostigma Steindachner, Denkschr. Akad. Wien LXX. 1900, p. 486.
Upeneus pleurostigma Waite, Rec. Austral. Mus. IV. 1901, p. 37.
Pseudupeneus pleurostigma Jenkins, Bull. U. S. Fish. Comm. XXII. (1902) 1904, p. 456.
Pseudupeneus pleurostigma Snyder, l. c. p. 527.
Pseudupeneus pleurostigma Jordan & Evermann, op. cit. XXIII. (1903) 1905, p. 260.
Upeneus pleurostigma Snyder, Proc. U. S. Nat. Mus. XLII. 1912, p. 503.
Parupeneus pleurostigma Barnard, Ann. S. Afric. Mus. XXI. 1925—27, p. 590.
Upeneus pleurostigma Herre & Montalban, Philipp. Journ. Sci. XXXVI. 1928, p. 122.
Upeneus pleurostigma Fowler, Proc. Acad. Nat. Sci. Philadelphia LXXVII. 1925, p. 260.
Upeneus pleurostigma Fowler, Fish. Oceania, Mem. Bern. Bishop Mus. X. 1928, p. 231.

D.^{1} VIII, D.^{2} I 8; A. I 6; L.l. 28—30; L.tr. $\begin{array}{c}2^1/_2\\ \hline 1\\ \hline 5^1/_2\end{array}$

Oblong, compressed, height 3.5 to 3.6 in length; head 3 to 3.3, much longer than high, its rostro-dorsal profile evenly but not strongly arched with a slight concavity before eyes. Eye small, more or less than 5 times in head, smaller than convex interorbital space; situated high up, in young in middle of head, later for its major part in posterior part of head. Mouth rather small, nearly horizontal, mandibula included; maxilla slightly rounded posteriorly; distant from vertical through eye by $^3/_4$ eye-diameter. Snout somewhat rounded, twice or less longer than eye. Barbels surpassing posterior angle of praeoperculum or nearly so. Operculum with a small, flat spine. Gillrakers 17 and 7 small ones on lower branch of first branchial arch. Scales large, weakly ctenoid, reaching on head to nostrils; praeorbital naked; sensory tubes on lateral line branched. Spinous dorsal much higher than soft dorsal; first spine minute, second flexible, somewhat shorter than third and fourth, which are subequal and go 1.3 to 1.5 in head; second dorsal somewhat lower than anal, about 2.5 in head, both fins are sligthly emarginate, their last ray nearly not produced; distance between first and second dorsal shorter than half length of base of first. Pectorals and ventrals subequal, about 1.3 in head; caudal somewhat shorter than head. Least height of caudal pendunce twice shorter than its length. Colour in alcohol grayish above lighter below, a round black spot in lateral line below interspace between the two dorsals, behind it, for the major part somewhat above lateral line, an oblong yellow blotch; fins yellowish, the second dorsal with traces of longitudinal bands, caudal dusky. Length 250 mm. [Specimen of BLEEKER's collection in Amsterdam Museum seen by us].

Habitat: Banda; Ambon. — Zanzibar, Aden, Delagoa Bay, Mauritius, Madagascar, Japan (Okinawa), Philippines, Lord Howe Isl., Gilbert Isl., Tahiti, Hawaiian Isl. (Laysan). In sea.

12. **Parupeneus pleurospilus** (Blkr.).

Upeneus pleurospilos Bleeker, Nat. Tijdschr. Ned. Indië IV. 1853, p. 110. — Nalez. Ichth. Japan. p. 69, Verh. Batav. Gen. XXVI. 1854—57, p. 69.

Upeneus pleurospilus Günther, Cat. Brit. Mus. I. 1859, p. 407.

Parupeneus pleurospilus Bleeker, Versl. Akad. Amsterdam, XVI. 1864, p. 360.

Upeneus pleurospilos (?) Klunzinger, Abh. zool. botan. Ges. Wien XX. 1870, p. 746.

Parupeneus pleurospilus Bleeker, Révis. Mulloides, p. 31, Verh. Akad. Amsterdam XV. (1873) 1875. — Atl. ichth. IX. 1878, Pl. 391, fig. 5.
Parupeneus luteus Klunzinger, Fische Rothes Meer 1884, p. 52 (p. parte).
Pseudupeneus pleurospilos Jordan & Seale, Bull. Bur. Fish. XXV. 1906, p. 276.
Pseudupeneus pleurospilos Seale, Occ. Papers Bishop Mus. IV. 1906, p. 51.
Pseudupeneus pleurospilos Snyder, Proc. U. S. Nat. Mus. XXXII. 1907, p. 96.
Upeneus pleurospilos Snyder, op. cit. XLII. 1912, p. 502.
Upeneus pleurospilos Herre & Montalban, Philippine Journ. Sci. XXXVI. 1928, p. 128.

D.^{1} VIII. D.^{2} I 8—9; A. I 6—7; L. l. 29—30; L. tr. $\begin{matrix}2^1/_2\\ \underline{1}\\ 5^1/_2\end{matrix}$.

Oblong, compressed, dorsal profile strongly arched from tip of snout to first dorsal, thence slowly tapering to caudal; ventral profile nearly straight to anal; height below origin of first dorsal about 3.5 in length, head 3—3.5, somewhat longer than high. Eye 4—4.7, shorter than convex interorbital space, situated one eye-diameter or less nearer to hindmargin of operculum than to tip of snout. Maxilla rounded behind, its distal width less than diameter of eye, terminating somewhat before frontmargin of eye; mouth somewhat oblique, the mandibula enclosed; barbels extending to hindmargin of operculum or almost so far. Gillrakers 18 + 2 rudimentary ones on lower part of first branchial arch. Scales weakly ctenoid, wanting on praeorbital, on snout reaching to anterior nostrils, otherwise present on head; sensory tubes sparingly arborescent. First dorsal much higher than second; the first spine minute, the second not pungent, of the same character as the third and almost of equal height, which goes about 1.5 times in head. Second dorsal and anal subequally high, more or less than 2.5 in head, only slightly emarginate, anteriorly higher than posteriorly but the last ray somewhat prolonged, anal shorter than second dorsal. Interspace between first and second dorsal much shorter than first, comprising about $4^1/_2$ scales. Pectorals about 1.4 in head, ventrals somewhat shorter. Caudal shorter than head. Least height of caudal peduncle nearly twice its length. Colour rose or yellowish, lighter below, a round dark spot below lateral line in the vertical through middle of first dorsal, faint or even absent in large specimens; three pearly coloured longitudinal bands from snout to operculum, the middle one crossing the eye; they are continued as three series of shining round spots on scales, visible even in alcohol specimens; second dorsal and anal with faint longitudinal bands, caudal lobes with four or five lighter crossbars. Length 240 mm.

Habitat: Bali; Celebes (Makassar!, Menado); Ambon; Saparua. — Red Sea (?), Japan, Okinawa, Philippines, Solomon Islands. — In sea.

13. **Parupeneus luteus** (C. V.).

Upeneus luteus Cuvier & Valenciennes, Hist. nat. Poiss. VII. 1831, p. 392.
Upeneus luteus Bleeker, Percoïden p. 63, Verh. Batav. Gen. XXII. 1849.
Upeneus luteus Montrouzier, Ann. Sc. phys. Soc. d'Agricult. Lyon (2) VIII. 1856, p. 430.
Upeneus cyclostoma Günther, Cat. Brit. Mus. I. 1859, p. 409 (nec C. V.).
Parupeneus luteus Bleeker, Ned. Tijdschr. Dierk. II. 1865, p. 285.
Mullus luteus Playfair, in Playfair & Günther, Fish. Zanzibar, 1866, p. 41.
Parupeneus luteus Bleeker, Révis. Mulloïdes p. 32, Verh. Akad. Amsterdam XV. (1873) 1875. — Atl. ichthyol. IX. 1878, Tab. 394, fig. 1.
Upeneus luteus Day, Fish. India 4°, 1878—88, p. 125.
Upeneus luteus Macleay, Proc. Linn. Soc. N. S. Wales VII. 1882, p. 246.
Parupeneus luteus Klunzinger, Fische Roth. Meer. 1884, p. 52.
Upeneus pleurospilos Fowler, Proc. Acad. N. Sci. Philadelphia 1900, p. 520 (nec Bleeker).
Pseudupeneus luteus Evermann & Seale, Bull. Bur. Fish. XXVI. (1906) 1907, p. 89.
Parupeneus luteus M. Weber, Siboga-Exp. Fische 1913, p. 296.
Upeneus luteus Herre & Montalban, Philipp. Journ. Sci. XXXVI. 1928, p. 114.
Upeneus luteus Fowler, Fish. Oceania, Mem. Bishop Mus. X. 1928, p. 232.

D.^{1} VIII, D.^{2} I 8; A. I 6; L. l. about 30; L. tr. $\begin{array}{c} 2^1/_2 \\ \hline 1 \\ \hline 6^1/_2-7 \end{array}$.

Oblong, height below first dorsal 3 to 3.50 in length, head 3 to nearly 3.2, somewhat longer than high, its rostro-dorsal profile convex, before eye almost straight. Eye 4.6 to 5 in head, situated somewhat nearer to hindmargin of operculum than to end of snout; the first distance being about $^1/_4$ longer than diameter of eye, the distance between eye and vertical through end of snout equal to about two eye-diameters; eye shorter than convex interorbital space. Mouth nearly horizontal, mandible enclosed, lips thick. Maxilla rounded posteriorly, $^1/_3$ diameter of eye distant from eye. Operculum in old specimens with a prominent spine. Gillrakers 20 on inferior branch of first branchial arch, the two lowest rudimentary. Barbels extending to hindmargin of operculum. Scales large, ctenoid, extending to nostrils, wanting on praeorbital; sensory tubes of lateral line arborescent. Spinous dorsal rather high, first spine minute, second and third spines subequal, the longest, 1.6 in head. Distance between first and second dorsal much shorter than base of first. Second dorsal and anal equally high, 2.50 in head; the former posteriorly emarginate, the latter truncate. Pectorals 1.2 in head [1]), somewhat longer than ventrals. Caudal almost shorter than head. Colour in alcohol uniformly yellowish brown, also the fins, the second dorsal and anal may show traces of longitudinal bands; head with four to five longitudinal blue bands which quickly fade. Length up to 300 mm. [Specimen of BLEEKER's collection in the Amsterdam Museum seen by us].

Nom. indig.: Bidjir-nangka (Malay.).

Habitat: Sumatra (Padang); Java (Batavia); Celebes (Makassar!); Sulu Arch.!; Ambon; Ceram; Mysore; New Guinea. — Red Sea, Aden, Zanzibar, Bourbon, Mauritius, Seychelles, Formosa, Philippines, Louisiade Arch., Woodlark Island.

Note: Bleeker has already expressed some doubt, if his specimens really belong to *Upeneus luteus* of Cuvier & Valenciennes. Sauvage (Poissons Madagascar 1891, p. 227) unites *U. luteus* with *U. cyclostomus* (Lac.) and maintains that „*U. luteus* est le jeune âge de cette espèce dont il ne diffère que par l'oeil qui est relativement plus grand." This seems to be a rather improbable assertion.

14. **Parupeneus janseni** (Blkr.)

Upeneus Jansenii Bleeker, Menado p. 44, Act. Soc. Sc. Indo-Neerl. I. 1856.
Upeneus Jansenii Günther, Cat. Brit. Mus. I. 1859, p. 411.
Upeneus Janseni Bleeker, Celebes p. 33, Act. Soc. Sc. Indo-Neerl. VIII. 1860, p. 33 (name only)
Parupeneus Janseni Bleeker, Ned. Tijdschr. Dierk. II. 1865, p. 147. — l. c. p. 285 (name only).
Parupeneus Janseni Bleeker, Révis. Mulloides p. 34, Verh. Akad. Amsterdam, XV. (1873) 1875. — Atl. ichth. IX, 1878, Tab. 392, Fig. 4.
Upeneus Jansenii Macleay, Proc. Linn. Soc. N. S. Wales VII. 1882, p. 246.

D.^{1} VIII. D.^{2} I 8; A. I 7; L. l 30; L. tr. $\frac{\frac{2}{1}}{6^1/_2}$.

Elongate, upper profile slightly flattened only above eyes, otherwise evenly convex from snout till first dorsal, thence tapering to caudal; lower profile nearly straight till ventrals. Height

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1) Herre & Montalban estimate the length of the pectoral as 4 times in head; this must be a misprint.

3.6, (about 5 with caudal after Bleeker) in length; head somewhat longer, 3.3 in length, (about 4 with caudal after Bleeker). Eye 5 in head, shorter than somewhat convex interorbital space, situated rather high up, about in the middle of head, its distance from hindmargin of operculum slightly less than distance from vertical through end of snout; this distance is somewhat less than twice diameter of eye. The oblique distance from eye to snout is more than twice length ef eye. Mouth slightly oblique, the mandibula enclosed, the maxilla rounded behind, its distal width about $^3/_4$ eye-diameter, extending to a short distance from vertical through frontborder of eye. Barbels throughout soft, not reaching vertical through hindmargin of operculum, extending near to origin of ventrals. Gillrakers 13 and 5 rudimentary ones on lower part of first branchial arch. First dorsal about one quarter higher than second; the first spine minute, the second rigid, slightly shorter than third, which is the longest and somewhat longer than half length of head. Second dorsal and anal subequal, decreasing in size posteriorly. Distance between first and second dorsal as long as base of first, both separated by 4 scales. Pectorals pointed, more than 1.3 in head and somewhat more than 5 in total length, longer than ventrals which do not reach vent. Caudal deeply incised with acute lobes. Least height of caudal peduncle about twice shorter than its length. Colour in alcohol uniform light reddish brown; second dorsal with faint traces of a darker median longitudinal band. Length 165 mm.

Habitat: Nias!; Celebes (Menado); Buru; Ambon; New Guinea.

15. **Parupeneus crassilabris** (C. V.).

Upeneus crassilabris Cuvier & Valenciennes Hist. nat. Poissons VII. 1831, p. 523.

Upeneus crassilabris Bleeker, Percoiden p. 4, Verh. Batav. Gen. XXII. 1849 (name only).

Upeneus crassilabris Günther, Cat. Brit. Mus. I. 1859, p. 411.

Upeneus crassilabris Smith & Swain, Proc. U. S. Nat. Mus. V. 1882, p. 129.

Parupeneus crassilabris Bleeker, Révis. Mulloides p. 33, Verh. Akad. Amsterdam XV. (1873) 1875. — Arch. Neérl. Sc. Nat. XIII. 1878, p. 46.

Pseudupeneus crassilabris Jordan & Evermann, Bull. U. S. Fish. Comm. XXIII. (1903) 1905, p. 259.

Upeneus crassilabris Fowler, Bull. Bishop Mus. XXXVIII. 1927, p. 16.

D. 8—1/8; A. 1/6, etc.

Il a le museau plus court, le chanfrein plus bombé, la tête plus haute. Le corps se rétrécit vers l'arrière, de manière que la hauteur de la queue n'est pas moitié de celle du corps, prise aux épaules. Les arbuscules de la ligne latérale sont très-divisés. Les dents sont fortes et conique, sur une seule rangée: il n'y en a point au palais. Les lèvres sont très-épaisses. Les barbillons n'atteignent pas la base des ventrales. L'épine de l'opercule est forte. La première dorsale est assez élevée; la caudale est peu fourchue; les deux lobes sont larges et arrondis; les ventrales sont très-grandes. Ce poisson paraît avoir été jaune, avec des points ou des lignes peu marquées sur les côtés. La première dorsale est violette; la seconde n'a que la base de cette couleur: la moitié supérieure est rayée de cinq à six raies parallèles longitudinales, alternativement blanches et violettes. L'anale, beaucoup plus pâle, a des points violets et un plus grand nombre de raies obliques. La caudale est plus foncée que la dorsale, et elle a des points blancs plus ou moins effacés. Les pectorales sont jaunes, plus ou moins olivâtres. Les ventrales ont les trois rayons externes colorés en violet, et les internes jaunâtres. La membrane branchiostège et les barbillons sont d'un brun violet plus ou moins foncé.

L'individu est long de neuf pouces. [After Cuvier & Valenciennes, not seen by us].

Note: Jordan & Evermann have given (l.s.c.) an ample description of what they regard to be the species of Cuvier & Valenciennes. In „The Fishes of Samoa" Bull. Bur. Fish. XXV. (1905) 1906, p. 275, the species appears again, but this time with the quotation in the synonymy: „? *Upeneus luteus* C. V.". Bleeker, already in 1874 (l.s.c.), expressed the same opinion, that *crassilabris* C. V. is possibly not distinct from adult specimens of *luteus* C. V.

16. **Parupeneus chryserydros** (Lac.)

Mullus chryserydros Lacépède, Hist. Nat. Poiss. III. 1802, p. 406.
Sciaena ciliata Lacépède, l. c. IV. 1802, p. 312 (fide C. V.).
Mullus radiatus Shaw, General Zoology IV. 2, 1803, p. 618.
Upeneus chryserydros Cuvier & Valenciennes, Hist. nat. Poiss. III. 1829, p. 470.
Upeneus chryserydros Bleeker, Percoïden p. 34, Verh. Batav. Gen. XXV. 1853 (name only).
Upeneus oxycephalus Bleeker, Acta Soc. Sc. Indo-Neerl. I. 1856, Vischsoorten Menado, p. 45.
Upeneus oxycephalus Günther, Cat. Brit. Mus. I. 1859, p. 409.
Parupeneus oxycephalus Bleeker, Ned. Tijdschr. Dierk. II. 1865, p. 285 (name only).

Mullus oxycephalus Playfair & Günther, Fish. Zanzibar, 1866, p. 41.

Upeneus chryserythrus Günther, Fische Südsee 1873—75, p. 60.

Parupeneus cherserydros Bleeker, Révis. Mulloides, p. 35, Verh. Akad. Amsterdam XV. (1873) 1875. — Atl. ichthyol. IX. 1878, Tab. 393, fig. 2.

Parupeneus xanthospilurus l. c. p. 37. — l. c. fig. 5.

Upeneus cherserydros Macleay, Proc. Linn. Soc. N. S. Wales VII. 1882, p. 246.

? *Upeneus filamentosus* Macleay, l. c. VIII. 1883, p. 264.

Parupeneus chryserythrus Klunzinger, Fische Roth. Meer., I. 1884, p. 52.

? *Upeneus chryserydros* Sauvage, Poiss. Madagascar, 1891, p. 228, Pl. 26, fig. 4 (nec fig. 3).

Parupeneus cyclostomus Steindachner, Denkschr. Akad. Wien LXX. 1900, p. 486.

Upeneus saffordi Seale, Occ. Papers Bishop Mus. I. 1901, p. 72.

Pseudupeneus chryserydros Jenkins, Bull. U. S. Fish. Comm. XXII. (1902) 1904, p. 454.

Pseudupeneus chryserydros Snyder, l. c. p. 527.

Pseudupeneus chryserydros Jordan & Evermann, l.c. XXIII. (1903) 1905, p. 255.

Pseudupeneus chryserydros Jordan & Seale, Bull. Bur. Fish. XXV. (1905) 1906, p. 275.

Pseudupeneus aurantiacus Seale, Occas. Papers Bishop Mus. IV. 1906, p. 48 (fide Fowler).

Upeneus chryseredros (*sic*) Jordan & Richardson, Bull. Bur. Fish. XXVII. (1907) 1908, p. 260.

Parupeneus chryserydros M. Weber, Siboga-Exp. Fische, 1913, p. 296.

Upeneus chryserydros Herre & Montalban, Philipp. Journ. Sci. XXXVI. 1928, p. 127.

Upenens chryserydros Fowler, Fish. Oceania, Mem. Bishop Mus. X. 1928, p. 232.

D.^{1} VIII; D.^{2} I 8; A. I 7; L. l. 30—31; L. tr. $\begin{array}{c} 2^1/_2 \\ \hline 1 \\ \hline 6^1/_2 \end{array}$.

Elongate, somewhat compressed; dorsal profile more convex than ventral. Height below origin of first dorsal 3.6—3.7 in length. Head 3.1, long, pointed, its rostro-dorsal profile slightly arched till first dorsal, nearly straight till occiput, somewhat concave between snout and eye. Eye 5.3 to 6.6 in length of head, situated in hinder part of head, about twice its diameter distant from hindmargin of operculum and nearly thrice its diameter distant from vertical through end of snout; shorter than somewhat convex interorbital space. Maxillary terminating almost one eye-diameter distant from vertical through frontborder of eye; its hindborder rounded and about as broad as diameter of eye. Mandibula enclosed; lips thick. Nostrils far distant, seperated by a distance of about one and a half diameter of eye. Gill-rakers 19 to 21, the last three or four rudimentary. Operculum with a small flat spine. Barbels not rigid, reaching base of ventrals or nearly so. Scales large, ctenoid reaching nearly anterior nostrils, wanting on praeorbital; sensory tubes arborescent. First dorsal much higher than second, anteriorly elevated; the first spine minute, second slightly shorter than third and fourth, which are subequal, the longest, and encreasing in size with age (or sex?), 1.6 to 1.8 in length of head. Second dorsal and anal slightly emarginate, the last ray somewhat prominent, almost subequal, their height 2.5 to 2.8 in length of head. Pectorals almost 1.6 in head, shorter than ventrals. Caudal much shorter than head. Least height of caudal peduncle almost half of its total length. Colour in alcohol yellowish brown, the back somewhat darker, with a paler or brighter narrow saddle on caudal peduncle and more or less conspicuous blue longitudinal lines on head which easily fade. In life the colours are brilliant but quickly vanishing, the back bluish, the lower parts rosy, head yellowish with blue lines, spinous dorsal, ventrals and caudal more or less dark blue, soft dorsal and anal striped. Length up to 380 mm.

Habitat: Nias!; Celebes (Menado); Sangir Isl.; Karkaralong Isl.!; Batjan!; Ambon; Goram; New Guinea. — Red Sea, Zanzibar, Bourbon, Mauritius, Madagascar, British India, Seychelles, Okinawa, Philippines, Solomon Isl., Fidji Isl., Society Isl., Samoa Isl., Tubuai, Tahiti, Faté, Guam, Hawaiian Isl. — In sea.

Note: Günther (Fische Südsee p. 60) has given an excellent review of the difficulties in distinguishing *P. chryserydros* from *cyclostomus*, arising from insufficient, partly even mutilated material upon which Lacépède built up his two species. The deficiencies in his dagnoses of them Cuvier & Valenciennes tried to supply with characters taken from other specimens, without security, that they really belonged to either of them. We are under the impression, that Sauvage has perpetuated the confusion, by using the material in the Paris Museum and confounded the two species, so that his figure 4 on plate 26 of his opus about the fishes of Madagascar represents not *cyclostomus* Lac., but what is generally named *chryserydros* Lac., while his species with a much larger eye, more anteriorly situated and with a much shorter snout, represented in figure 3 on plate 26, corresponds with *cyclostomus* Lac.

Doubtful species.

17. **Parupeneus bilineatus** (C. V.).

Upeneus bilineatus Cuvier & Valenciennes, Hist. nat. Poissons VII. 1831, p. 525.
Upeneus bilineatus Bleeker, Percoiden p. 14, Verh. Batav. Gen. XXII. 1849.

Upeneus bilineatus Günther, Cat. Brit. Mus. I. 1859, p. 411.
Parupeneus bilineatus Bleeker, Ned. Tijdschr. Dierk. II. 1865, p. 285. — Révis. Mulloides, p. 38, Verh. Akad. Amsterdam XV. (1873) 1875.

D. 7—1/8; A. 1/6, etc.

Elle a le museau court, le chanfrain très-bombé et le profil presque vertical, comme dans le petit rouget barbet de nos mers. Les barbillons courts, ne dépassent pas l'angle de l'opercule.

Ce petit poisson n'a que trois pouces de long; il a le dos brun, la tête et les flancs rosés, le ventre blanc; deux raies jaune d'orpin rehaussent le long des flancs la coleur du corps. La première dorsale, noire à son extrémité, a deux raies obliques olivâtres: la seconde a également deux petites raies obliques de la même couleur. L'anale, la caudale, les ventrales, les barbillons et les lèvres sont jaunes. [Description after Cuvier & Valenciennes, not seen by us].

Habitat: Ambon.

Note: This species, known only after the description above quoted, belongs to *Parupeneus* as it is one of three species of which Valenciennes says; „elles appartiennent toutes trois à la division des upénéus à dents coniques sur une seule rangée et à palais lisse". According to Bleeker it is characterized by its nearly vertical profile and by its colours, which are more those of *Upeneus* and of *Mulloidichthys* than of *Parupeneus*

Doubtful as to locality.

18. **Parupeneus dispilurus** (Playfair).

Mullus dispilurus Playfair, in Playfair & Günther, Fish. of Zanzibar, 1866, p. 41.
Mullus pleurotaenia Playfair, ibidem.
Upeneus dispilurus Herre & Montalban, Philippine Journ. Sci. XXXVI. 1928, p. 111 (description & references).

A. B. Meyer (Catal. Peces recolect. en el Archipiélago de las Indias orientales, Anal. Soc. Esp. Hist. nat. XIV. 1885, p. 16 (12)) quotes this fish from North Celebes, without giving any description or remark to recognize it. Otherwise it has never been found in the Archipelago and we doubt its occurrence there.

19. **Parupeneus cyclostomus** (Lac.).

Mullus cyclostomus Lacépède, Hist. nat. Poiss. III. 1802, p. 404.
Upeneus cyclostoma Günther, Cat. Brit. Mus. I. 1859, p. 409.

Parupeneus cyclostomus Bleeker, Ned. Tijdschr. Dierk. II. 1865, p. 285.
Upeneus cyclostomus Herre & Montalban, Philipp. Journ. Sci. XXXVI. 1928, p. 123 (see references).

This fish is recorded by Herre & Montalban as occurring in the „East Indies''. We suppose on the authority of Bleeker who quoted it in a list of fishes from Ambon (l. s. c.) and twice from Madagascar and neighbouring islands. The quotation from the Archipelago (Ambon) is never repeated and in his „Révision des Espèces des Mulloïdes'' (Verh. Akad. Amsterdam XV. (1873) 1875) the species is not named as occurring in the Archipelago. We conclude therefore, that the quotation was an error and that the species is not known from the Archipelago.

ADDENDA AND CORRIGENDA.

p. 1. As noticed in a footnote on page 1 of this volume, we have prepared in the following lines a short Synopsis of the order, suborder and first division of the Percomorphi, which are treated in the preceding (Vth) volume and continued in the present and following volumes. This Synopsis has to stand instead of what wrongly was called on page 268 of volume V: „Order Perciformes."

Order PERCOMORPHI.

Symmetrical, acanthopterygian fishes with an airbladder without an open duct. Scales generally ctenoid, sometimes

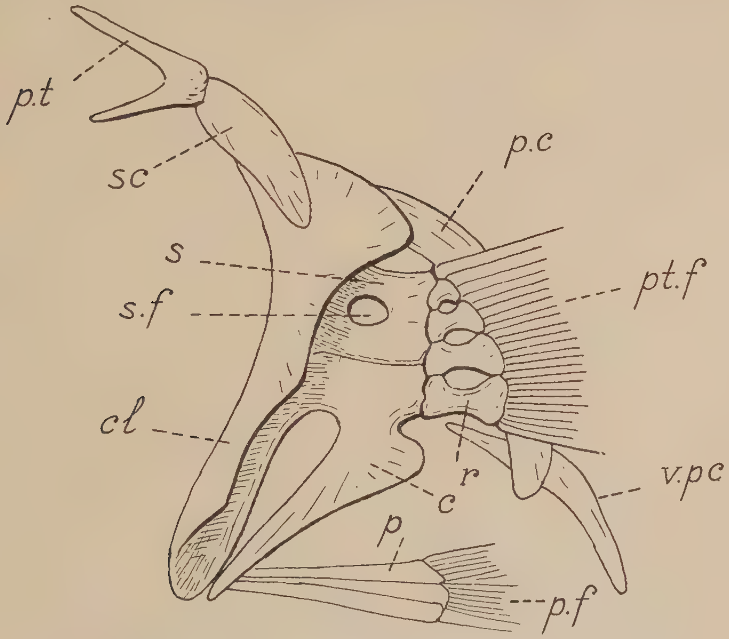

Fig. 80. Left half of the pectoral girdle, left pectoral fin, and pelvic girdle of *Serranus cabrilla* L. After Goodrich. *c* coracoid; *cl* cleithrum; *p* right pelvic bone; *p.c* post clavicle; *p.f* left pelvic fin; *pt* posttemporal; *pt.f* pectoral fin; *r* radial; *s* scapula; *sc* supraclavicle; *s.f* scapular foramen; *v.pc* ventral postclavicle.

cycloid and seldom wanting. Dorsal generally well developed with a spinous and soft portion. Anal usually with few spines. Pectoral spine normally present; radials of pectorals four or five in number, more or less hour-glass-shaped, longer than broad, one or two of them in contact with the coracoid. Mesocoracoid and orbitosphenoid wanting. Ventrals thoracic or subthoracic, with one spine, exceptionally with two (family Amphacanthidae) and not more than five soft rays. Pelvic bones directly attached to cleithra. Caudal with not more than 17 principal rays. No bony stay for the praeoperculum. Parietals separated by the supraoccipital. Posttemporal more or less distinctly forked. Opercular bones well developed. Lower pharyngeals normally not ankylosed.

1. Suborder PERCOIDEA.

Body usually oblong, covered with ctenoid scales of moderate or small size, rarely cycloid or wanting. Lateral line present, usually more or less concurrent with dorsal profile. Head laterally compressed; eyes lateral, two nostrils on each side of head. The dermal bones of cranium deeply sunk and generally covered over with scales. No cranial spines 1) Subocular shelf often present. Mouth more or less protractile, terminal or subterminal, usually pointed, with a moderate cleft. Maxilla almost or completely excluded from the border of the mouth. Opercular apparatus complete. Teeth in jaws various; on vomer, palatines and tongue present or absent. Anus behind ventrals, remote from the extremity of tail; no anal papil. Dorsal of various structure but typically with some stiff spines in its frontal part. Anal usually with three spines, rarely more or none. The vertical fins may be partly scaly.

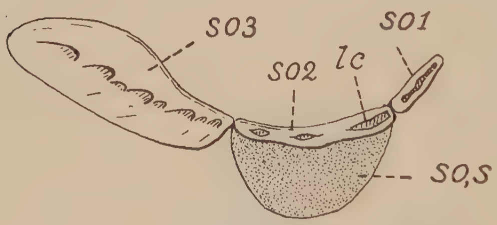

Fig. 81. Suborbitals of *Serranus cabrilla* L. enlarged. After Goodrich. *lc* lateral line in suborbital canal; *So 1—3* suborbitals; *so,s* suborbital shelf.

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1) In Leiognathidae postnasal spines and supraocular crests present.

1. Division **Perciformes.**

Body more or less compressed, oblong or elongate, sometimes elevated, covered usually with ctenoid, rarer with cycloid scales, sometimes embedded in the skin, or lanceolate; cheeks and opercles usually scaly Lateral line with simple, divided or arborescent sensory tubes, generally complete and concurrent with the dorsal profile; by exception interrupted [1]) or modified in its posterior part [2]). Spinous dorsal usually well developed [3]), with rigid, pungent or flexible spines, longer or shorter than soft dorsal with which it is often united. Anal of similar form and structure as soft dorsal but often shorter; in some genera preceded by two free spines, connected in young by membrane to the fin and often obsolete with age. Ventrals thoracic with a spine and five, rarely four, soft rays, with or without an axillary scale-like process. Pectorals well developed, inserted high, all the rays branched, none incrassate. Mouth protractile, ihe intermaxillaries with more or less developed pedicels and nearly always free from maxillaries; a supplemental maxillary bone (supramaxillare) present or absent. Five to eight branchiostegals; four gills with a slit behind the fourth; pseudobranchiae more or less developed, often rudimentary or absent. Opercular bones typically serrate, at least in young. Lower pharyngeals normally not ankylosed to form a single bone [4]). Teeth small, in pluriseriate bands or in a single row in jaws, sometimes mixed with larger ones or with canines, which may be depressible; on vomer, palatines and tongue present or absent.

Add to Habitat (seen by us!):

p. 19. *Epinephelus pachycentrum* (C. V.): Island Kerkhof: Duizend Islands, Java Sea.
p. 20. *Epinephelus boenack* (Bl.): Island Dapur, Island Kerkhof: Duizend Islands, Java Sea.
p. 40. *Epinephelus chlorostigma* (C. V.) Sunda Sea.
p. 44. Cancel „(sic)" after *Epinephelus daemeli* Jordan & Seale.
p. 46. *Epinephelus sexfasciatus* (C. V.) Bay of Batavia; Digul river: New Guinea.

---

1) Some Ambassidae, the Pseudochromidinae and the Nandidae.

2) In Carangidae.

3) Rudimentary in some Carangidae, wanting in Bathyclupea.

4) Lower pharyngeals coossified in *Centrogenys* and some species of *Gerres*.

p. 54. *Epinephelus summana* (Forsk.) Island Dapur, Island Kerkhof: Duizend Islands, Java Sea.
p. 56. *Epinephelus amblycephalus* (Blkr.). Off Island Tioman, near Anambas Islands (Museum of Singapore).
p. 57. *Epinephelus nebulosus* (C. V.) Bay of Batavia.
p. 58. *Epinephelus fasciatus* (Forsk.) Island Dapur: Duizend Islands, Java Sea.
p. 64. *Epinephelus merra* Bl. Island Onrust, Island Dapur: Duizend Islands, Java Sea. — Island Biak (Schouten Islands) near New Ginea.
p. 66. *Epinephelus caeruleopunctatus* (Bl.) Island Biak (Schouten Islands) near New Guinea.

p. 91. Read in Key to the indo-australian species of Chelidoperca: „1. Ch. hirundinacea" instead of „Ch. hirunainacea".
p. 119. In the legenda of Figure 21, read: „*Pseudogramma polyacanthus*" instead of „*Pseudogramma polycanthus.*"
p. 131. In „Habitat", read: „Ternate" instead of „Ternatae".
p. 200. Second line from above read: „*C. kiliche* C. V." instead of „*D. kiliche* C. V.".
p. 315. Read in Key to the indo-australian species of Leiognathus: „11. *L. smithursti* instead of „*L. smithhursti*".

ADDENDA TO VOLUME V.

p. 49. *Macrurus* (*Coelorhynchus*) *flabellispinis* Alc. is recorded by Brauer (Tiefsee-Fische, I System. Teil, 1906, p. 258) also from the West Coast of Sumatra. *Coelorhynchus flabellispinis* Alcock is according to Gilbert & Hubbs (The Macrouroid Fishes of the Philippine Islands and the East Indies, Smithsonian Institution, U. S. Nat. Mus. I, 1920, p. 497) closely related to *C. Smithii* Gilbert & Hubbs. They think it not unlikely that Brauer's specimens from the West Coast of Sumatra are referable to *C. smithii.*

p. 79. *Macrurus* (*Macrurus*) *Investigatoris* Alcock, is recorded by Brauer (Tiefsee-Fische; 1906, p. 260) from the West Coast of Sumatra. The species has found a place in the „List of the known species of Macrouroid Fishes", published by Gilbert & Hubbs (Proc. U. S. Nat. Mus. LI, 1916, p. 146), in the genus *Lionurus* Gthr. and named „*Lionurus investigatoris* (Alcock)".

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1) As in Java the three languages: javanese, sundanese and malay are spoken, we have accordingly placed behind the indigenous names (Malay.), (Sundan.) or (Javan.). In naming a fish the malay people use as a rule "ikan" = fish before the special name. In most cases we have omitted "ikan".

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